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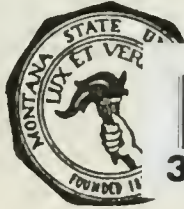
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Fish and Game Commission





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STATE OF MONTANA
BIENNIAL REPORT
of the
**FISH AND GAME
COMMISSION**
for
MAY 1, 1952 — APRIL 30, 1954



FEB 18 1969

Published By The
MONTANA FISH AND GAME COMMISSION
Helena, Montana

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FOREWORD

Montana's wildlife resources have continued to prosper during the biennium even in the face of ever-increasing demands by the hunting and fishing public. Sportsmen, recreationalists and nature students from all over the nation look to Montana for its clear, clean waters, its wilderness areas and its vast acreage of unspoiled out-of-doors.

The real value of our wildlife heritage lies in its contribution to the relaxation, health and general well-being of our nation's people, but economically, the recreation business can also stand in its proper place with other industries in the state.

With this ever greater interest in Montana's wildlife and in the face of rapidly changing conditions brought about by demands of civilization, the responsibility of managing the wildlife resource has become correspondingly increased. Management, charged by law to the State Fish and Game Commission, must today be based upon scientific facts. Mistakes brought about by popular appeal, uninformed demands or selfish interests can be costly in terms of the future of wildlife.

In approaching this responsibility, the Fish and Game Commission has, wherever possible, predicated its program on long-range policies, based on factual information and research. That all of these policies will not be popular is understandable, but it is believed that thinking and informed citizens will recognize the need for scientific long-range planning on matters pertaining to wildlife management.

For this reason, a definite effort has been made in this Biennial Report to include not only a detailed fiscal and activity report, but also to include some of the thinking that has governed the decisions made in setting up such a program.

It is also hoped that this report, because of the detailed and factual material, will serve as a reference on Montana Fish and Game Commission activities for the legislature, sportsmen, citizens and students.

To the Honorable J. Hugo Aronson
Governor of Montana

Dear Governor Aronson:

In accordance with Montana law, we herewith submit the Biennial Report of the Montana Fish and Game Commission for the period May 1, 1952 through April 30, 1954.

Expansion of the Fish and Game Commission activities has been necessitated by the corresponding increase in public demands for outdoor recreation and activities associated with the sports of hunting and fishing.

It is the purpose of this report to review the Commission's finances over the past two years, the activities and progress that have been completed during this period as well as the reasons for the program and policies undertaken by the Commission.

Respectfully submitted,

MONTANA STATE FISH AND GAME COMMISSION

WALTER BANKA, Chairman
WILLIAM T. SWEET, Member
MANSON H. BAILEY, JR., Member
H. W. BLACK, Member
RALPH D. SHIPLEY, Member
A. A. O'CLAIRE, Secretary

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ADMINISTRATION



ADMINISTRATION

Stewardship of Montana's wildlife resources is vested by law with the five-man Fish and Game Commission which authorizes all operations of the Department through its executive officer, the State Game Warden.

This body is responsible not only for the careful administration of its funds in operational expense, but also for the proper management of the fish and game resources from which the bulk of funds are derived.

The Commission meets for two days each month to consider current problems, form policies and adopt necessary regulations to meet changing conditions.

Authority of the Commission to set seasons, bag limits and other regulatory measures within the provisions set forth by legislative assent, is of necessity flexible. Decisions are based on the most comprehensive information available from field personnel, sound recommendations from sportsmen and landowners.

However, some of the Fish and Game Codes have become obsolete over the years, others need amendment and even more important are several entirely new concepts for Fish and Game Laws to keep pace with the changing wildlife picture.

Several recommendations for needed legislation are given at the end of this section. These were drawn up after careful study by a committee, appointed by the Governor, which made the proposed revisions after consultation with the Fish and Game Commission, sportsmen, landowners and other interested individuals.



Electrical business machines were rented during the biennium to facilitate special permit drawings. On antelope permits alone, the process which formerly required six or more weeks was completed by machine in ten hours. Plans call for installation of these machines for use in future drawings, fisheries creel census work, beaver control and other fur research, detailed distribution of accounts, preparation of payrolls, property control, questionnaires, cataloging of license sales and other work.

The physical job of keeping detailed records of income and expenditures is a function of the administrative branch of the Department. With an annual income of more than one and one-half million dollars, and a capital evaluation of more than two million dollars, the job of accurate records is considerable. During the past biennium, increasing use has been made of electrical business machines in bookkeeping procedure. Electric machines are also now used in drawing special permits for buffalo, mountain sheep, mountain goats, moose and antelope. Machinery has greatly expedited this work, with increased efficiency and economy.

Within the accounting division nearly 500 separate accounts are maintained for the dealers who distribute the licenses from which the Department obtains most of its finances.

Detailed property records are kept as required by law and since the Department receives Federal Aid funds, a report of the property purchased for Dingell-Johnson and Pittman-Robertson projects must be submitted annually to the U. S. Fish and Wildlife Service.

In Helena, a warehouse is operated where supplies may be stored and distributed to personnel all over the state. Purchase of needed materials and supplies is handled through the State Purchasing Department. For this service, the Montana Fish and Game Department allocates \$3,000 each year.

Equipment maintenance and construction are facilitated by mechanical and woodworking shops operated in Helena where the specialized equipment required in wildlife management can be constructed and repaired.

As in any organization, the Administration Division functions as a service group, basic in the job of managing the state's wildlife resource.



Distribution of the 450,000 separate licenses of all types to the 500 authorized dealers throughout the state requires accurate record keeping of the serially numbered forms as well as careful packaging of the completed order for shipment. All licenses are held in Helena and released in a single mailing before May 1.

INCOME AND EXPENDITURE

May 1, 1953 - April 30, 1954

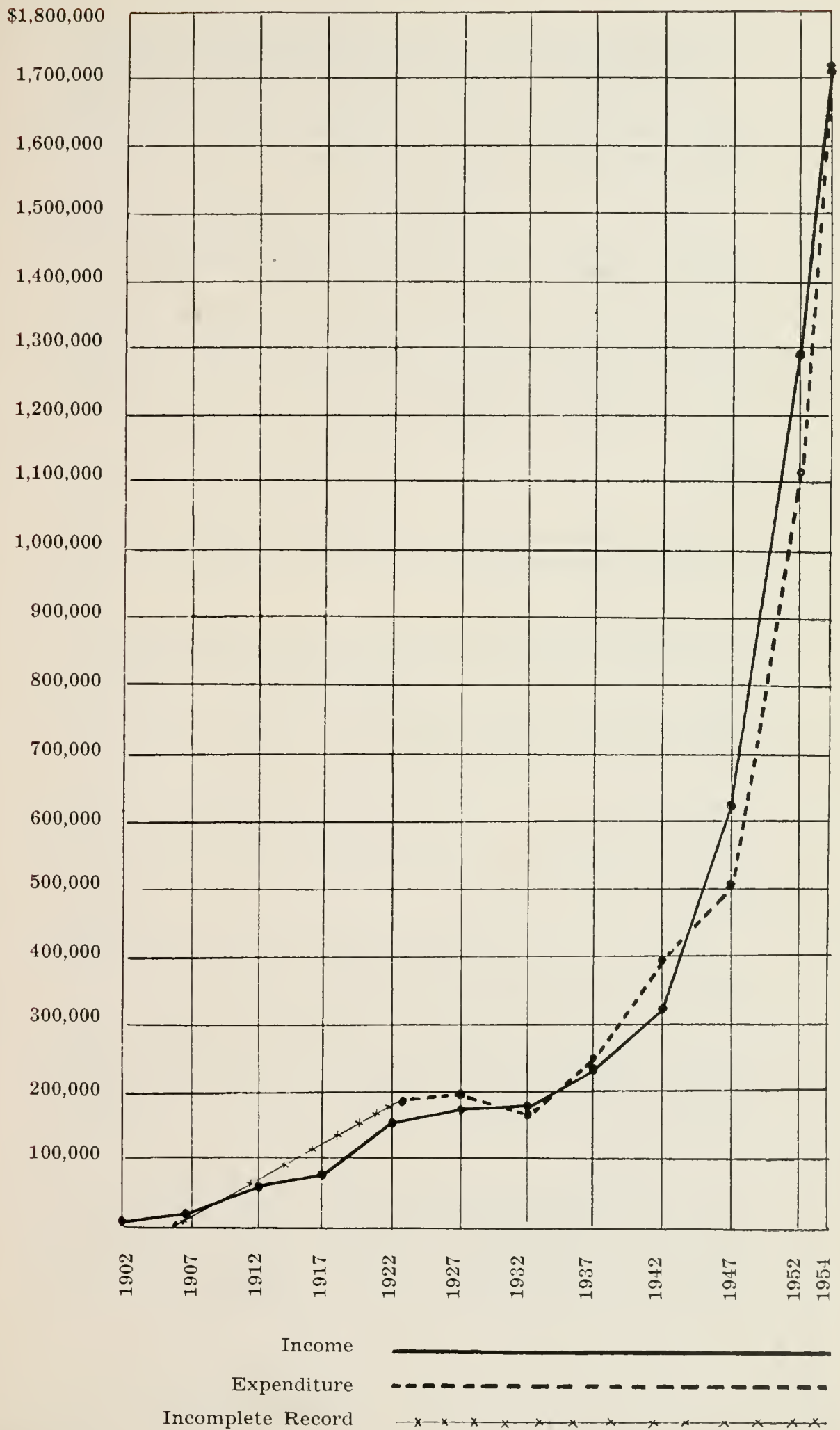
INCOME

HUNTING & FISHING LICENSES
AND SHIPPING PERMITS 70.6 %
OTHER LICENSES & PERMITS 1.90 %
FINES 2.18 %
MISCELLANEOUS 3.96 %
PITTMAN-ROBERTSON 16.64 %
DINGELL-JOHNSON 4.72 %

EXPENDITURE

RESTORATION 31.04 %
FISHERIES 25.85 %
ENFORCEMENT 22.10 %
MISCELLANEOUS 4.26 %
ADMINISTRATION 6.92 %
GAME FARMS 4.10 %
PREDATOR CONTROL 3.68 %
INFORMATION-EDUCATION 1.63 %
COMMISSIONERS 0.42 %

(1902 Through April 30, 1954)



LEGISLATIVE RECOMMENDATIONS

1. AUTHORITY TO ISSUE SUMMONS AND ACCEPT BAIL BOND IN THE FIELD. Due to the increased number of hunters and fishermen enjoying this type of recreation, the job of policing this group has been proportionately enlarged.

It would be a great aid to enforcement if wardens had authority to issue summons and accept bail bond in the field to guarantee the appearance in court of the person accused of the violation.

The efficiency of the Department's field force would be greatly expanded by such authority, as the arrest of a person violating the law would not take the warden out of the field of activity. At present, wardens are sometimes taken away from areas of hunter or fishermen concentration for periods ranging from several hours to a whole day while they accompany the violator to the nearest justice court.

Since a great portion of arrests for game and fish violations occurs on Sundays and holidays, the holding of the persons accused of the offense until courts open is often a problem which has not always been satisfactorily handled.

2. AMENDMENT TO BEAVER CONTROL LAW TO PERMIT DESTROYING BEAVER DOING DAMAGE TO IRRIGATION INSTALLATIONS. The beaver damage to irrigation installations has increased enormously during the past ten years. This is attributed to lessened demand for beaver pelts in the fur trade and the subsequent lack of an adequate harvest of beaver populations by trappers.

The first general open season on beaver in 36 years was held during the 1953-54 trapping season. Approximately 16,000 beaver were harvested during that season but the beaver were still under-trapped for it is estimated that the annual increment was greater than this amount.

Requests to remove nuisance beaver from irrigation installations have been too numerous for the warden force to handle. Many beaver have been destroyed by water users during irrigation season and not in accordance with existing regulations.

An amendment to the beaver control law, providing that land owners and irrigation district employees may destroy beaver causing damage to irrigation installations without a permit during the months of June, July and August of each year, will help solve the beaver damage problem.

3. AUTHORIZATION FOR SPECIAL NON-RESIDENT ANTELOPE OR DEER PERMITS WITHOUT THE PRESENT PREREQUISITE OF THE \$100 NON-RESIDENT BIG GAME LICENSE and also AUTHORIZATION TO GRANT TWO ANTELOPE PER PERMIT IN CERTAIN AREAS. Under the existing antelope permit law, there is an inadequate harvest of antelope in certain areas of

the State. It is believed that the saturation point has been reached in issuing antelope permits to resident hunters. This figure is between 20,000 and 25,000 hunters who are interested in antelope hunting.

Because the permit system will retain control of the antelope population and prevent annihilation in the areas which are easily accessible to large numbers of hunters, it is very desirable to retain the permit system with some modifications.

Non-resident hunters do not apply for antelope permits because of the restrictive \$100 non-resident big game license which is a prerequisite for obtaining any special permit. It is believed that if a special non-resident antelope permit were available for direct sale to antelope hunters, without requiring the purchase of the \$100 non-resident license, several thousand of these permits could be sold, especially in areas of eastern Montana where a surplus antelope problem exists.

The money that would be spent in Montana by non-resident hunters seeking antelope would be of great economic importance to all of the people of the State.

If the Montana Fish and Game Commission were also allowed to grant two antelope per permit in certain areas, it would also help solve the problem.

It is also recommended that a special non-resident deer permit be provided for certain areas without requiring non-resident hunters to purchase the \$100 big game license first.

This permit would also be an inducement to non-residents to come into the eastern part of the State to hunt antelope and at the same time to hunt deer where a deer damage problem exists. In such areas, resident hunters have not been numerous enough to adequately harvest the deer.

OTHER RECOMMENDATIONS FOR CHANGES IN LEGISLATION have been submitted by the Governor's Committee on Recodification of Fish and Game Laws. The committee was authorized by the 33rd Legislative Assembly which enacted Chapter 140, providing for appointment, powers and duties of this Committee.

Members are Sen. Don Valiton, Deer Lodge; Rep. R. H. Wiedman, Polson; and John Willard, Helena. This Committee and the Montana Fish and Game Commission worked closely on all sections of the law which were in need of clarification or revision. The proposals were mailed to all sportsmen's organizations in the State for consideration and received wide-spread publicity through radio and newspaper coverage.

LAW ENFORCEMENT



LAW ENFORCEMENT

Fish and Game law enforcement is a phase of wildlife management which has changed in general objectives within the past few years. At one time, the primary emphasis was on the apprehension of violators, but today, an increasing effort is directed toward prevention of violations by education.

However, a certain percentage of the people continues to be willful violators so law enforcement remains a primary duty of the warden force. The imposing of laws and regulations governing the take or harvest of wildlife is a necessity in assuring all hunters and fishermen an equal opportunity to share in the wildlife crop while at the same time protecting game populations from excessive over-kill. This is an important tool in management. It is the warden's job to see that this portion of a management program is effective.

To sum up briefly, the enforcement phase of a warden's job is to "encourage a regulated use and to discourage an abuse of wildlife resources."

The warden force has expanded during the past two years and presently is composed of 52 district wardens and seven district supervisors. Each district supervisor has supervision of from six to ten district wardens. The district supervisor is the coordinator of the work of the district wardens within the district and with other Department field project personnel.

DISTRICT MEETINGS

Periodic meetings of personnel on each district are held for the purpose of discussing district administrative problems and instruction and training programs are provided. Information is given to warden personnel about their Department projects, fiscal matters, policies, and a variety of subjects are discussed and explained in order to put a better informed officer in the field.

At such group meetings, also come recommendations for seasons and bag limits for consideration of the Commission when it sets the seasons on the various wildlife species. Another important value of these meetings results from supervisory personnel obtaining first-hand information from the field as to existing conditions of wildlife for management purposes.

RECRUITING

New warden employees are chosen from an eligible list which has been established from applicants who have successfully passed a competitive written examination and a subsequent oral interview. During the past two years, examinations for filling the warden positions were held on December 18, 1952 and March 15, 1954. New wardens are placed in training under the district supervisor before receiving an assignment as a district warden.



Written examinations were given to nearly 200 applicants for game warden positions during the biennium. Those selected are required to serve an apprenticeship and a probationary period of one year before receiving permanent status.

DISTRICT HEADQUARTERS PLAN

A program was begun to acquire sites for district supervisors' headquarters. The plan for the present is to provide office and equipment storage space which is most sorely needed. De-centralization of some of the administrative details will be effected at these headquarters, thus giving better service to the public.

The buildings will be used by other personnel as well for headquarters while assigned to projects on the supervisor district. The storage provided will make it possible to pool equipment, supplies and manpower to accomplish work in the district at a saving to the Department.

ARRESTS

Arrests for violations of the game laws continued to increase over the preceeding biennium, although approximately the same number of hunters and fishermen were in the field. During the current biennium, a total of 1,592 arrests were made compared to 1,415 in the previous two-year period. The increase in number of convictions is partially due to more effective methods of patrol and detection.

Airplanes were placed on three supervisor districts for law enforcement and all other purposes for which airplanes are used in the Department. The airplanes, equipped with two-way radios, search out areas for hunter concentrations and direct patrol groups. Four-wheel drive equipment is available on some districts to keep abreast with others using this type of equipment for hunting and fishing activity. The size of boats and motors furnished to the warden force is determined after considering the type of work to be accomplished. An attempt has been made to provide the law enforcement division with the best equipment available so that the warden force has the means to check hunters and fishermen using similar equipment.



INFORMATION and EDUCATION



INFORMATION AND EDUCATION

Wildlife management, which is the primary function of the Montana Fish and Game Department, can proceed no faster than the rate permitted by public understanding and support. Thus, the challenge facing the Department is to gain that support and understanding by means of providing current factual information.

Research, management, development and enforcement are generally learning new facts and techniques faster than these can be transmitted to the general public. Until these facts are put into practice, they are of no value and the job of providing fish and game to fishermen and hunters is made correspondingly less effective. This job of bringing new findings and other general information to Montana citizens is the responsibility of the Information and Education Division.

The Montana Fish and Game's Information and Education Division, the newest major section in the Department, has made definite progress during the past biennium in developing a suitable program of conservation information and education.

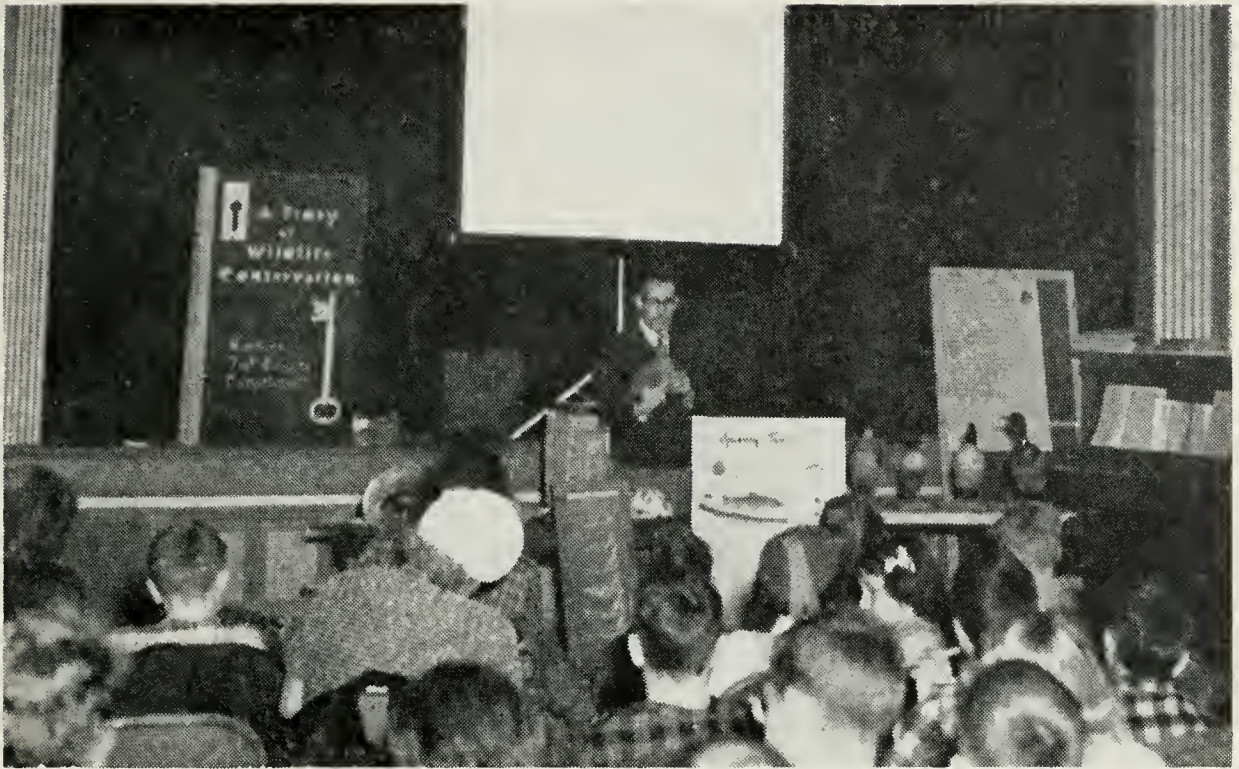
Youth and adult education programs were the newest development to materialize during the past two years. Probably one of the most far-sighted efforts is the Commission's plan to provide \$15,000 to be divided between Montana State College and Montana State University to finance wildlife extensionists in the conduct of Adult Education programs throughout the state.

The division has gradually expanded its youth program within the limits of its personnel.

Both the adult and youth programs are basic in approach, teaching that wildlife is a product of the land and dependent upon soil, water and vegetation. Appreciation of natural resources and how

With Governor J. Hugo Aronson (seated) are young Montana conservationists and a panel of resource professionals. The teen-agers were candidates in statewide competition to determine Montana's Outstanding Young Outdoor American.





An important phase of the conservation education program is the study course presented in Montana classrooms. Lectures and demonstrations cover all segments of wildlife as well as the inter-related resources including soil, water, land use, etc.

these are important to the state and national economy and welfare is also emphasized.

The Department has adopted the general philosophy that citizens provided with the basic background and information will make wise decisions and laws in the management and use of state resources.

Continued participation at youth camps, such as 4-H and Boy Scouts, was also a feature of the biennium and the first annual Young Montana Conservationists program to reward and recognize outstanding teen-age conservationists was completed with considerable success.

Increased effort was made in scheduling the department's educational wildlife display at County and State Fairs. This exhibit is much in demand and is generally considered one of the outstanding attractions. Last year, 16 fairs featured the collection of native Montana game animals, birds and fish with an estimated attendance of over 200,000.

In making the exhibit available to Montanans, the Department feels that knowledge derived from observing the animals close at hand will create a greater interest and appreciation of this valuable resource. Education is stressed along with the entertainment so natural to wild animal displays. Many of the animals were loaned by the "See 'em Alive" zoo at Red Lodge and the "Wonderland Zoo" at Billings.

Information services stress the importance of keeping Montana citizens informed of the actions and ideas of the Fish and Game

Department. Through the wire services and radio stations, the public is advised of daily decisions and of important fish and game announcements. This same information is assembled and distributed once each week to the weekly newspapers over the entire state, thus providing an essential service to persons living in rural areas.

Approximately sixty radio programs are prepared annually as current hunting and fishing topics. These receive fairly complete state-wide coverage. Expansion of radio programs and entry into the television field are definitely to be considered if future budgets permit additional activity.

One of the most important jobs of the Information and Education Division is inter-departmental education. A formal system of "In-Service Training" was developed and the first school was held at the Blackfoot-Clearwater Game Range Headquarters. Personnel were given intensive training in game management, biology and public speaking. Annual courses will be held in all phases of departmental activity with the objective of having a staff of completely informed personnel who will accomplish their work with maximum efficiency. In keeping with this latter objective, a complete technical library is maintained by the division in which all current writings and reports on wildlife subjects are available to personnel.

Special emphasis has been placed on several subjects needing particular attention. Firearm safety has been approached with school programs, distribution of literature and posters and through the use of three films on hunting safety.

Pamphlets explaining care of game were distributed; several news releases and radio programs featured the various aspects of

Intensive "In-Service Training" of wardens is another educational program carried on within the Department. Wardens attend a two-week "school" designed to acquaint them with operations of all other divisions, public speaking, popular feature writing, general biological instruction and other subjects.



proper care of wild meat, and other phases of education featured Landowner-Sportsman relationships.

Montana's free quarterly magazine, "Montana Wildlife," featuring Departmental activities and programs, continued in popularity with an estimated readership of over 25,000. It is sent to all Montana schools and any person making a request.

A vast amount of promotional work is accomplished by the Division incidental to its regular duties. Inquires by both resident and non-resident have necessitated increased general information services. Approximately 10,000 letters are mailed annually to persons inquiring about Montana's hunting and fishing.

Continued cooperation in publicity programs was extended to the Montana Chamber of Commerce and the Montana Highway Department's Advertising Director. Assistance is provided each year in conducting the Outdoor Writers Tour which results in much favorable national publicity. Photographs and literature are supplied to free lance writers wherever possible.

A special booklet, "Hunting and Fishing in Montana," hunter's maps and fishing regulations were distributed to hunters and fishermen all over the nation.

A lending library of moving pictures and colored slides provides illustration for talks as well as educational entertainment. Photographs and moving pictures are also prepared on department projects. The preparation of sound movies will be an even more important future activity of this division as it has developed practical techniques for economical moving picture productions.

With the increased interest in fish and game, it is natural that people should request more and more information. Personnel of this division, as well as those in other divisions, spend many evenings and weekends attending meetings of civic groups, educational groups, sportsmen's organizations and other interested agencies.

It is evident from the experiences of the biennium that additional personnel are required to meet the increased demand for conservation information and education. It is hoped that future expansion will be possible so one man can be stationed in each of the seven supervisor districts. These men would be assigned to the work of conducting school programs of conservation education, working on Landowner-Sportsmen's programs, supplying information and education on a district level and generally broadening the public's knowledge of its natural resources.

Such activity, conducted by trained men, will do much to promote more enlightened consideration by the public of not only wildlife programs but of agricultural, forest and other resource problems as well. In view of the increasing demands for all natural resources, the educational efforts of any agency as to their proper use is a real contribution to the state and national economy.

WILDLIFE RESTORATION



WILDLIFE RESTORATION PROGRAM

Introduction

The end of this biennium marks the fourteenth year that Wildlife Restoration funds have been available for use in Montana's Fish and Game Department program.

This division was organized following legislative assent to the Wildlife Restoration Act (Pittman-Robertson) in 1941. The monies allotted the various states for wildlife purposes under this Act are obtained through an excise tax on sporting arms and ammunition. The amount each state receives is dependent upon the size of the state and the number of licenses sold. In using this money the Montana Fish and Game Commission pays for one-fourth of the cost of the program and the Federal Government the remaining three-fourths.

The program thus made possible is initiated and carried out entirely by State personnel. All equipment and lands purchased become the property of the State. The assent to this Act through the years of its existence has allowed Montana to carry out an important and varied program, the greater portion of which would have been impossible otherwise due to the lack of funds.

An important part of the work carried out under this Division has been the gathering of necessary information needed by the Commission in the management of big game, game birds, waterfowl and fur-bearing animals. Some of the more important aspects of this phase of the program consist of obtaining census figures by age and sex classes, as well as reliable information on distribution, annual increase, hunter harvest, range and food conditions and predation.

During the past two years, work has continued in rounding out the acquisition of several important winter big game range areas, and also vitally needed marsh land for waterfowl development and public hunting. In regard to this acquisition program, during the past legislative session a law was enacted allowing the State Fish and Game Commission to pay the various counties an amount in lieu of taxes comparable to that paid by private landholders and based upon routine assessment.

The management of beaver on public lands within the State was made possible two years ago by the action of the State Legislature. This necessitated the gathering of a great deal of information upon which this expanded program has been based. This work was carried out by the personnel of the fur section of the restoration program.

The marked increase of antelope and deer throughout much of the State during the past several years has brought about the need for a careful analysis of the feeding habits of these two important big game species. This work will materially aid in correlating the management of big game with agriculture.

Perhaps the most important phase of the program highlighted during the past two years has been the acquisition and development of waterfowl areas. Although the need for public hunting areas has not as yet presented as serious a problem in Montana as in the more thickly populated states, it is felt its future assurance is being guaranteed by such acquisition programs and will become increasingly important in the future.

More detailed phases of the Wildlife Restoration program with particular reference to that accomplished during the past two years is summarized in the following pages.

Big Game

Big Game Statewide Population Figures		
	1952	1953
Antelope	59,600	66,034
Grizzly Bear	737	719
White-Tailed Deer	46,600	68,000
Mule Deer	181,700	201,700
Elk	42,100	46,900
Mountain Goat	4,100	4,400
Moose	3,500	3,100
Mountain Sheep	1,700	1,400

The above figures indicate a continued upward trend among several species of big game. The taking of either sex deer throughout much of the state has become necessary in order that numbers of game may be kept in balance with forage available to them, particularly during severe winter periods. Observation has indicated that a higher rate of production is evidenced among big game herds on range where adequate amounts of forage are available.

This basic principal as applied to game management indicates the desirability of a substantial hunter take throughout many big game ranges in the State to assure a maximum annual increase. In addition to this important objective, hunter harvest, as based upon

field information obtained through the program, is also geared to avoid serious conflicts with agricultural interests.

Winter Game Ranges

The past two years have emphasized the importance of previously acquired big game winter ranges, both in maintaining adequate game numbers and in avoiding conflict with adjacent private lands. The management of the important Sun River elk herd is now based upon the carrying capacity of the winter range area. From one of the most difficult big game problems this Sun River herd has become a model of present day management, chiefly due to the presence of an acquired winter range in the foothills.

The Judith River Game Range, acquisition of which was started fifteen years ago, has been rounded out and now is carrying out many of the important functions ascribed to the Sun River Range. Although considerably smaller in size, its importance is proportionately high.

The Blackfoot-Clearwater Big Game Range has been of particular importance in overcoming a number of difficult problems pertaining to the wintering of both elk and deer in that area. Elk tagged on the game range, when killed by hunters have indicated the wide area influenced by this winter range.

The Gallatin Game Range is adding a material source of forage for elk in that area where deep snows seriously handicap the winter foraging activities of elk.

An additional small game range tract has been purchased during the biennium. It is located in the Whitetail area adjacent to the

42.



Live-trapped elk await ear-tagging before release on Judith Game Range.



Judith Game Range headquarters buildings at Utica.

Bull Mountain elk range. It is anticipated that the presence of this supply of forage maintained for big game will aid in working out a problem now existing in that area.

Range Inventory

In order that these game ranges may be properly managed, a careful forage inventory is being conducted on each. This information will indicate the proper number of game animals that can be carried from year to year.

Game Salting

The placement of game salt was carried out on a statewide basis during the past two years. Airplane drops were used to good advantage in the more remote regions. It is felt that desirable distribution of game may well be influenced by the proper location of salt. Approximately eighty tons were placed on big game ranges during each of these two years; almost half of it was distributed by the use of airplanes.

Kootenai Dam

A detailed analysis of the effect on wildlife of a possible dam on the Kootenai River in Lincoln County was carried out during the past year. In addition to the local importance of this study, it is felt that it will add materially to the consideration of other like proposals.

Grizzly Bear

A careful study of the numbers and distribution of the grizzly bear has been conducted in the more remote ranges along the Continental Divide. An important correlation between this rare big game species and wilderness type range has been observed. It is becoming increasingly evident that this big game animal is distinctly intolerant to activities brought about by road construction and has been found to virtually disappear from heavily logged or otherwise seriously disturbed areas.

Upland Game Birds

This type of game in Montana falls roughly into two types. The introduced species such as the ring-necked pheasant, chukar partridge and the Hungarian partridge; and the various native grouse species. The native species appear to fit into a population pattern that fluctuates in cycles seemingly quite independent of hunting pressure.

This point has been recently demonstrated by a study conducted in the Bitterroot Mountains where the East Fork has been open to grouse hunting during the past four years while the West Fork, a comparable area, has remained closed. No measurable difference can be observed in the population of grouse between the hunted or unhunted area.

Sage Grouse

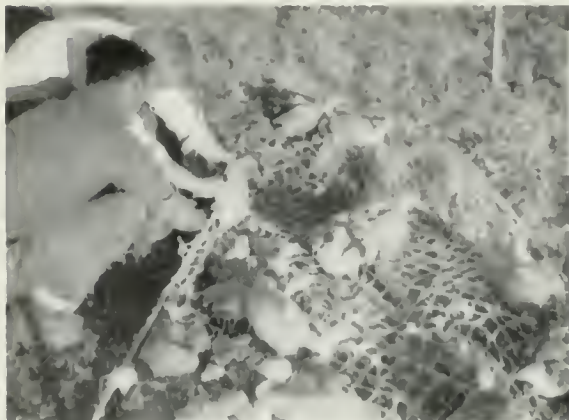
A method of accurately aging sage grouse developed by a department biologist based on the comparative development of the wing feathers has added an important technique to the management of this species of prairie grouse.

Ring-necked Pheasant

The management of the ring-necked pheasant, the yearly abundance of which appears closely dependent upon food and weather conditions, has been based upon annual census and distribution information. Because of this, an important aspect of the game bird program has been the determination of numbers based upon spring crowing counts, roadside censuses, brood counts, and sex ratio counts made before and following the hunting season. All this information is of vital importance in determining hunting season regulations.

Hungarian Partridges

The Hungarian partridge, although reasonably well established in the State, does not as yet represent an extremely important game bird species. This is due for the most part to its general lack of abundance.



Sage grouse studies during the biennium included live-trapping (left) and neck-banding (right) to determine daily and seasonal movements, longevity, population trends and other data necessary in the management of the species.



Brood stocks of Chukar partridge are reared at Montana Game Bird Farms for release in selected areas in an effort to establish this species for Montana sportsmen. Although it has successfully adapted itself to many of the areas where it has been released, it has not as yet reproduced in sufficient numbers to make hunting feasible.

Chukar Partridge

In order to add to hunting possibilities, the chukar partridge, an exotic from Southern Asia, has been recently introduced. Earlier plants in neighboring states have indicated that its most desirable habitat is in the more arid rocky sections. To date 16 major plants have been made. Field observations have been carried out in order to determine the success of these various introductions. Although a fair degree of nesting success has been observed, it is as yet too soon to predict the final outcome of this most recent addition to the upland game birds of Montana.

Merriam Turkey

The entire State has been carefully inspected with the objective of determining the feasibility of introducing the Western or Merriam's turkey. Careful observations have been made of the better turkey range in neighboring states. From this work it appears that Montana contains several favorable areas which meet all of the important requirements of the wild turkey with the possible exception of a mast bearing species such as scrub oak. Introduction of this species will be made on a trial basis and careful study of each transplant will provide a key as to the practicability of developing wild turkeys in Montana.

Waterfowl

Waterfowl, due to their migratory habits, are considered an international wildlife resource. To properly manage these wide-ranging birds, Montana actively cooperates with the U. S. Fish and Wildlife Service and the various neighboring states, as well as Canadian provinces and Mexico.

During the past six years, Montana's program of waterfowl investigation and research has been tied in closely with the continental management of this resource. Waterfowl are actually managed on the basis of four continental flyways.

Montana, due to its large size and geographic position, is traversed by portions of three of these flyways—the Pacific, Central and Mississippi. It is located largely in the Central Flyway, however, and is regulated on that basis.

Vitally needed information which must be obtained on an annual basis consists of a breeding ground inventory, production or brood counts, hunter bag checks, as well as information pertaining to the winter carry-over of waterfowl in Montana (winter inventory). All of this information is carefully analyzed and is very useful in the State's management of waterfowl.

Marsh Development Areas

Several vitally important marsh land areas are being acquired and developed. The chief objective is to increase local production and assure public hunting for present and future generations of Montana sportsmen.

Montana is governed by federal regulations set up for the Central Flyway although waterfowl from the two adjacent flyways are also found in the state.





Construction of an outlet canal, representing the initial phase of development of Freezout Lake, was begun during the biennium.

Freezout Lake (Greenfields)

This area in Teton County, consisting of approximately twenty-five hundred acres of water, four thousand acres of marsh and twenty-five hundred acres of nesting and feeding edge, represents an important waterfowl production and hunting area. The lake's water level has been unpredictable in the past since it has no outlet and acted as a sump for natural runoff and waste water from an adjacent irrigation district.

A rapid rise in water level two years ago caused material damage to surrounding agricultural lands, nearby state highway and two adjacent railroads. Under a restoration program a water control drain structure is being constructed. When completed it will be possible with this facility to maintain the lake at a desired level.

A degree of fluctuation may also be obtained whenever necessary for management purposes. The construction of dikes within the project area will also increase its desirability for both waterfowl production and hunting purposes. The maintenance of various food crops, such as grain about the edge of this marsh area, will act as a buffer against possible waterfowl depredation on surrounding agricultural lands.

Its location upon a natural flyway just east of the main Rocky Mountain system also enhances its importance to waterfowl. This, plus the proximity of heavy hunting pressure, certainly places this project in the category of a major development for the entire western section of the United States.

Ninepipe-Pablo

This is a combined acquisition and waterfowl habitat development project located in the Lower Flathead Valley. The assurance of public hunting in this particularly important waterfowl area is a major aspect of this project. The production of supplemental food about the edge of the Ninepipe-Pablo area will undoubtedly increase its waterfowl production, facilitate hunting and act as a buffer against possible waterfowl depredation.

The acquisition of these lands ties in very closely with the purchase of several goose nesting islands in Flathead Lake, as well as brooding areas necessary in the development of year around habitat requirements of an important population of Canadian geese which add materially to the hunting success in that area.

An intensive investigation of these geese has indicated that those produced in the Flathead Valley contribute more to the hunter than those migrating through the area.

Milk River

In the Milk River area along the Highline, several waterfowl marsh areas have been scheduled for acquisition and development. During the present biennium one of the most important of these, the Sleeping Buffalo Marsh in eastern Phillips County, has been obtained under a long time lease. It has been fenced, and will be developed by diking and further flooding to materially increase the waterfowl production and hunting possibilities in that area.

One of the most important aspects of this program is the vital location that this marsh bears to the other waterfowl producing areas in that region. In addition to the many species of ducks frequenting this area, one of the most important Canadian goose populations in the state is now being developed in that region. Public hunting will therefore represent an additional important aspect of the program.

Fox Lake

Fox Lake in Richland County west of Sidney is being acquired and will be developed for waterfowl production and public hunting.

A careful analysis has been made regarding the value to waterfowl of fencing portions of the shore line reservoirs in eastern Montana. Virtually thousands of reservoirs are scattered throughout the eastern section of the state. These areas, varying in size between a fraction and several hundred acres in size, represent an important contribution to the waterfowl resource in that section of the State.

It has been felt that the protection of certain portions of these reservoirs from heavy use by livestock would increase the nesting possibilities, as well as increase food available for waterfowl without materially interfering with their usefulness as livestock watering places. A final report regarding this work is being compiled and will be available in the near future.

Fur Animal Research And Management

A comprehensive study of the fur resources of Montana was initiated three years ago with the addition of a Fur Resources Section to the Wildlife Restoration program. Since that time much factual information has been collected by biologists of the section to guide development of a constructive program of fur animal management.

Fur animal research has been a neglected field, not only in Montana but in many other states as well. As a result, specific methods of obtaining factual information on the lives and habits of fur animals are often not available. Out of necessity many of the activities of Fur Resources Section workers have been concerned with the development of techniques. Examples of this are studies on beaver, mink and marten aimed at providing methods of determining the age composition of the annual take.

Other activities are chiefly concerned with investigations of the status and welfare of the various fur animal populations. In addition, information on the habits and distribution of the various species is collected. Each year these data are integrated and used as the basis for trapping seasons which allow an annual harvest while assuring the maintenance of a satisfactory breeding stock.

Economic Survey



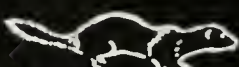


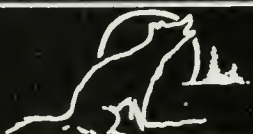



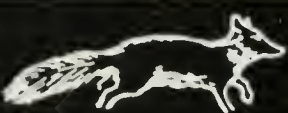
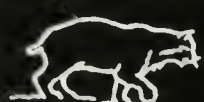

Fur animals are unique as a wildlife resource in that they provide a direct cash crop. This crop is harvested with relatively little investment on the part of the trapper and frequently is taken by seasonal workers at a time of year when other types of employment are scarce. Information was lacking to fully evaluate the significance of the fur resource in Montana's economy. Accordingly, an economic survey was one of the first activities undertaken by the Fur Resources Section.

During the biennium a total of 2,717 trapper's licenses were issued. Listed on the following page are the furs taken by these trappers and their value.

Furs taken during the past two seasons totaled approximately 159,000 pelts worth more than one-half million dollars. Three species—beaver, mink and muskrat—produced more than 90 per cent of the pelts and nearly all of the income, reflecting current market trends. Approximately 80 per cent of these furs were produced in the western half of the state where more than three-fourths of the trappers operated. About ten per cent of the pelts taken were sold to out-of-state buyers.

Average prices for most fur animals declined from levels of past seasons; however, a progressive management plan for beaver, based

Size And Value of Fur Take

		1952-53 No. Pelts Value	1953-54 No. Pelts Value
Muskrat		64,733 \$ 60,849	39,382 \$ 23,045
Beaver		9,936 \$ 95,485	16,123 \$154,796
Mink		6,848 \$ 95,256	9,378 \$119,349
weasel		2,233 \$ 1,965	3,282 \$ 2,265
Bobcat		927 \$ 1,122	1,097 \$ 1,196
Coyote		196 \$ 437	104 \$ 90
Skunk		1,965 \$ 1,788	1,664 \$ 1,431
Raccoon		373 \$ 489	412 \$ 486
Badger		154 \$ 106	148 \$ 99
Fox		6 \$ 8	14 \$ 14
Lynx		8 \$ 40	21 \$ 63
wolverine		2 \$ 40	4 \$ 80
Total		87,381 \$257,585	71,629 \$302,914

on research findings, permitted a greater harvest of beaver. Largely as a result of the increased beaver catch, the average income to the individual trapper rose from \$214 in the 1952-53 season to \$244 in the 1953-54 season.

Beaver

The history of Montana's beaver population is that of extirpation through intensive, uncontrolled trapping in the 1800's followed by protection during the first half of the twentieth century. Beaver management during the latter period was confined to restoration and limited trapping on private lands for beaver damage alleviation. Areas of overpopulation, manifested by "die-offs" and increasing economic conflict, began showing up during the 1930's. By the late '40's a high beaver population existed throughout the state.

In July 1952, the Fish and Game Department, concerned with the situation, initiated through the Fur Resources Section a study of beaver populations in the Jefferson Basin. This study was designed to evaluate the true situation and to provide a sound management plan. Preliminary results indicated: (1) a high beaver population existed, (2) the landowner permit system was inadequate for obtaining a sustained yield harvest, (3) a change in beaver laws was apparently needed.

Cognizant of the problem, the 1953 Montana Legislature amended the beaver law, authorizing the Fish and Game Commission to declare open seasons. With the advent of this legislation, the immediate need for a basic beaver management program became apparent.

Utilizing pertinent research results of the Jefferson Basin beaver study in addition to the beaver research reports of other workers, Fur Resources Section personnel formulated such a program. This management plan is based on beaver trapping areas which coincide with local deputy game warden districts.

The management of each area is administered by the resident deputy game warden. Annually, a trapping quota is set for each area and trappers register for trapping in the area of their choice. The individual trapper's limit in an area is determined by dividing the area quota by the number of trappers registered. Deputy game wardens have the authority to designate specific trapping locations for each trapper within their beaver trapping area.

This basic plan resolved the problem of administration and provided means of adjusting the distribution of harvest. Maximum harvest limits could be controlled and regulations to control illegal beaver pelt traffic could easily be formulated and administered. Certain problems were, however, not solved.

A maximum, sustained, annual or periodic harvest from a basic population compatible with all values involved is in most cases the objective of beaver management. To attain this objective it is

necessary to know what the ideal population level is, and when it has been reached. What constitutes a sustained-yield harvest of this population, and how to attain and recognize it must be determined.

The proper population level is determined by the welfare of the animal itself and by its value to man. An ideal balance between a minimum and a maximum population must be quantitatively resolved to provide for the beaver's welfare. Soil and water conservation, sport fisheries, wildlife habitat development, fur and other positive values, as well as the negative values of agricultural conflict, timber destruction, road damage, stream obstruction, etc., must be quantitatively expressed to properly determine the ideal population level.

Part of the beaver research conducted by the Fur Resources Section is directed toward this problem of population levels. Results on beaver "carrying capacity" studies in the Jefferson Basin are giving the determinants of the population level conducive to the welfare of the beaver. Through these studies it is possible to understand some of the factors of population levels and to better define an ideal situation.

Maximum sustained yield cropping is determined by the annual net increment of an ideal population. It is difficult, however, to know when a beaver harvest constitutes sustained-yield cropping. Montana's research on this problem includes age-ratio methods development, aerial colony count trend analysis and beaver harvest analysis.

The age-ratio of a beaver population will change under varying intensities of trapping. A method of determining age-ratio figures through pelt-measurement analysis was developed by section personnel and is now in use on a state-wide basis.

Annual state-wide aerial colony counts were initiated in the fall of 1953. These counts constitute only an index designed to help determine population trends and thus the relative intensity of cropping. Approximately one-fifth of the state's beaver habitat is involved in this operation. Results of the first count indicated that over half of the state contains a "maximum" beaver population.

A comprehensive harvest analysis is conducted at the end of every season. This shows the number trapped, dates of capture, trapper success and the ratio of private land to public land utilized, for every beaver trapping area.

Through these studies of age ratios, aerial colony count trends and harvest analysis, the status and trend of beaver populations can be determined and within reasonable limits the status of harvests in relation to sustained-yield cropping can also be ascertained.

In the last two years beaver management in Montana has shown considerable progress. Much of this progress can be directly attributed to the research and planning of the Fur Resources Section. The Fish and Game Department's program will continue to improve as

the research results on which progressive management is based become available.

MINK

Previous to the 1953-54 season, muskrats received the heaviest trapping pressure. Because of a marked decline in prices for muskrats during the 1953-54 season, many trappers trapped fewer or no muskrats at all and expended greater effort in taking mink. As a result, the muskrat catch dropped 39 per cent while the increased pressure on mink caused the take to rise 37 per cent.

This situation had been anticipated and accordingly, an age and sex ratio study of the mink take was begun in July, 1953. Inasmuch as the size of the annual mink take is influenced by market and weather conditions as well as by population levels, information based on biological indicators was needed by supplement catch records as a measure of population status.

Nearly 1,000 mink carcasses representing approximately 15 per cent of the 1953-54 mink take were collected from trappers throughout the state. Analysis of this material is still progressing and will soon provide factual information to guide the establishment of trapping seasons in accordance with the status of mink populations.

MARTEN

One of the greatest opportunities for increased production of furs is presented by restoration and proper management of Montana's marten populations. It is felt that the state's potential production of



Live-traps hidden in the ends of fallen logs, chopped out of rotten snags or concealed in various other places known to be frequented by marten are used to capture this furbearer. Trussed up flexible wire cones (right) they are ear-tagged, weighed, aged, sexed and examined as to reproductive ability as part of a continuing study.



marten under careful management may be several times its present level. As a result of overtrapping in past years, many areas of suitable habitat now support very few or no marten.

In addition, extensive burned areas on which regeneration of forest cover has progressed to a stage suitable for utilization by marten are being considered for restoration through a transplanting program. Areas of these types are being investigated and evaluated as transplant sites.

A long-range investigation of marten living requirements based on live trapping was undertaken in cooperation with the Montana Cooperative Wildlife Research Unit to supply information essential to a sound management plan. Successful methods of trapping, handling and marking marten were developed and much useful information has resulted from the application of these methods. In addition, the study of marked marten will determine whether the National Parks and larger game preserves in Montana contribute significantly to surrounding populations.

Unregulated distribution of trappers in the 1950-51 and 1951-52 marten season resulted in severe reduction of marten populations in some accessible areas while remote areas remained untrapped. This situation, coupled with a marked decline in the price of marten pelts, necessitated closed seasons during the past two years.

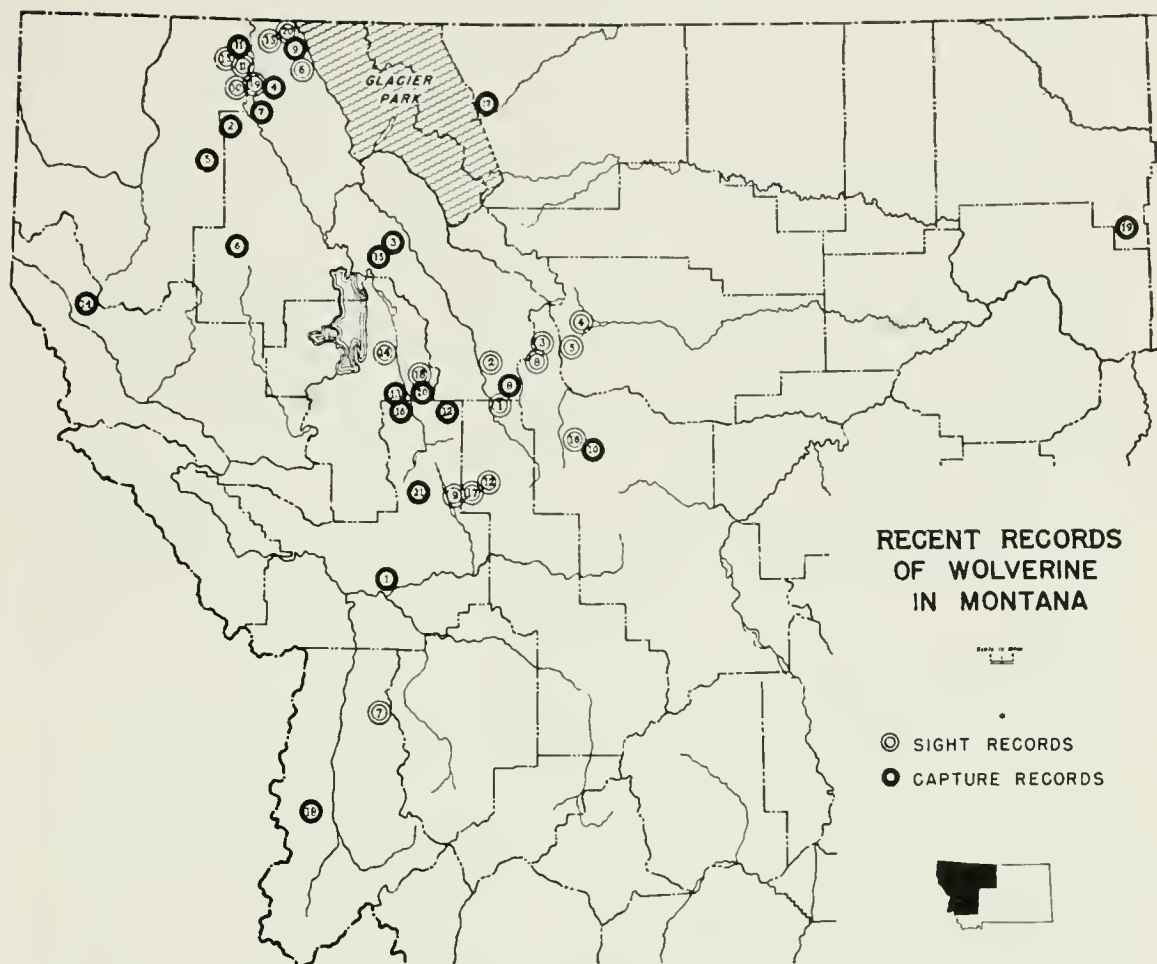
Marten are not as prolific as muskrats nor as wary as mink; therefore, the proper manipulation of trapping pressure is of especial importance. It is hoped that an aggressive program of transplanting followed by application of a sound management plan will bring marten populations to the point where a sustained annual harvest may be taken.

WOLVERINE

Information on the distribution and status of the wolverine was collected during the bienium in cooperation with the Department of



One of the nation's rarest wildlife species is the wolverine which was considered near extinction in Montana for many years.



A trend toward the "come-back" of the wolverine is indicated by sight and capture records in the above map.

Zoology, Montana State University. One of North America's rarest fur animals, the wolverine, was thought by many to be near extinction in Montana. Findings of the study indicated, however, that wolverine may be increasing in northwestern Montana and extending their range to other portions of the state.

Although the 21 known capture records of wolverine date back to 1932, 18 have been taken since 1939. Eleven have been shot or trapped since 1950. Known sight records of wolverines began only in 1944 and since then at least twenty observations have been made.

OTTER

Otter have been protected in Montana since the 1949-50 season. In the few areas of the state where they are often observed, irate fishermen have accused the otter of preying selectively on game fish, while trappers claim "they drive away and eat mink, muskrat and even beaver."

Between April, 1952 and May, 1953, a food habit study was conducted in the Thompson Lakes area of Lincoln County to supply information on the accuracy of these claims. A total of 1,374 otter

scats collected from 96 otter latrines and representing all seasons of the year is the basis for the findings presented.

Fish remains appeared in 93 per cent of the total scats, invertebrates in 41 per cent, amphibians in 18 per cent, mammals in 15 per cent, birds in five per cent and reptiles in less than one per cent.

Two well defined and separated areas existed in this total collection and analysis of each can be compared. One area showed the three most commonly occurring fishes to be: sunfish present in 71 per cent of the scats, suckers 31 per cent, sculpin 19 per cent—beaver in 0.2 per cent and muskrat 1.2 per cent. In the other area, trout were present in 52 per cent of the scats, suckers 43 per cent, sculpin 31 per cent, beaver three per cent and muskrat 19 per cent.

The waters of the Thompson Lakes region are heavily populated with fishes not particularly sought by fishermen. These fishes constitute a high percentage of the diet of the otter. Fishing pressure is light. These findings do not justify the conclusion that otter constitute a menace to the sport fishing of the area.

The data indicate that otter take some muskrat and beaver, particularly in areas of high populations. These surplus animals, if unable to establish a secure life, will become easy victims to predators whether it be man, otter, coyote or bobcat. These depredations should not be interpreted as a true reduction in population. They are more suggestive of a top-heavy population possibly resulting from insufficient harvests. It would appear that muskrat and beaver trapping in the area should be increased.

The numbers of otter do not appear sufficient to warrant an open season. There is the possibility, however, that a limited open season might stimulate an increase in reproduction and survival in this population and create a self-imposed protection by residents on an animal now subject to acts of vandalism.

An otter food habit study on the Gallatin River has been completed to the point of obtaining a year-around collection of more than 1,100 scats. The remaining studies will be on the Sun River-Gibson Lake area and on the Madison and Missouri Rivers.

PUBLICATIONS

Publications produced during the biennium by Fur Resources Section personnel are:

(Technical)

"Yearly food habits of the River Otter in the Thompson Lakes Region, northwestern Montana, as indicated by scat analysis." *American Midland Naturalist*. (in press). Kenneth R. Greer.

"Progress on a marten live-trapping study." *Transactions of the North American Wildlife Conference*, Vol. 19, pp 452-462. Fletcher E. Newby and Vernon D. Hawley.

"Distribution and status of the wolverine in Montana," *Journal of Mammalogy*, Vol. 36 (In press). Fletcher E. Newby and Phillip L. Wright.

Montana Cooperative Wildlife Research

The Montana Cooperative Wildlife Research Unit was formally established February 8, 1950, with a signed Memorandum of Understanding describing the Unit objectives as follows:

1. To provide technical and professional training on various levels in wildlife management, teaching, research, demonstration and administration.
2. To investigate and correlate the production, utilization, management and restoration of desirable populations of wildlife compatible with good land use.
3. To demonstrate research findings through extension and practical management of game and fur-bearing animals and of other desirable species of wildlife, and encourage wildlife restoration through programs with schools, youth clubs and adult groups.
4. To make available to land-owners and operators, sportsmen, conservation officials, extension workers, teachers and others the facts, methods and new findings discovered through research, and through literature suited to local and State conditions.
5. To disseminate research findings through the publications of reports, bulletins, circulars, and journal and magazine articles. These to include scientific, semi-popular and popular materials at all levels.

The operation of the Unit is administered jointly through a Coordinating Committee consisting of J. W. Severy, Montana State University, Missoula; A. A. O'Claire, State Fish and Game Warden, Helena; John J. Craighead, Unit Leader, U. S. Fish and Wildlife Service, Missoula. Cooperators in this important program are the Montana Fish and Game Commission which budgeted \$7,385.00 and \$7,200.00 annually during the biennial period, Montana State University which makes its facilities available to the Unit, the U. S. Fish and Wildlife Service which provides the Unit Leader and other facilities and the Wildlife Management Institute which gives an annual grant to the Unit. The location of this Unit at Montana State University makes available facilities and services of technicians in many specialized fields related to wildlife research problems.

All projects handled by the Research Unit have been of immediate interest and use to the Montana Fish and Game Commission. Findings have represented an important aid to the betterment of wildlife management in the State.

A major objective of the Cooperative Unit is to prepare students for professional wildlife positions. In addition to the graduates that have received instruction, direction and supervision from the Unit staff, a number of undergraduates have also received specialized field training outside of classroom work.

The third major objective has been to promote wildlife education. In this regard the Unit Leader has cooperated and participated in the Montana Wildlife Forum, a series of conservation lectures delivered throughout the State.

Kodachrome movie picture films are being developed by the Unit Leader. These will illustrate many aspects of present day wildlife research and management. It is expected also that this film will be developed for television showing, for sportsmen and adult education groups throughout the State.

Examples of several of the more important projects included in the Unit program during the past biennial period are as follows:

FEED REQUIREMENTS OF ELK

Objectives:

The purpose of this study has been to obtain information on the nutritional value of important forage species found on the big game ranges of Montana and more particularly:

1. To determine a forage requirement value for elk and cattle use in present and future elk range surveys:



Experimental elk held in feeding pens at the Blackfoot-Clearwater Game Range to determine forage requirements of this species as related to domestic stock.

- a. to determine weight change of elk and cattle under various forage conditions during the winter months;
 - b. to compare food requirements of elk and domestic cattle;
 - c. to establish food habit characteristics of elk on a free choice basis.
2. To rate various important forage plants for use in inventory work on elk winter ranges.
 3. To compare nutritional values of various types of feed available on elk winter ranges.

The information being obtained from this project has represented an important basis for the determination of the carrying capacity of the Fish and Game Commission's more important winter elk ranges, particularly the Sun River.

FACTORS INFLUENCING SURVIVAL OF RELEASED CHUKARS

Objectives:

1. To contribute to the knowledge of the life history of the chukar partridge.
2. To obtain survival, reproduction and dispersal information on spring and fall releases.
3. To attempt to determine when and under what conditions chukar releases are most likely to prove successful.

The findings of this project are of particular importance to the Montana Fish and Game Commission in planning the introduction of this species of upland game bird in the State.

LIFE HISTORY AND ECOLOGY OF MARTEN IN GLACIER PARK

Objectives:

1. To gather data on the life history of this very important fur bearer.
2. To determine population density and turnover, dispersal, range movement and distribution of marten by means of live trapping and tagging.
3. To correlate marten density with vegetation types and food supply.

The information being gathered from this project has immediate application in the management and restoration of the marten throughout desirable mountain ranges in the State.

BIGHORN SHEEP STUDY

Objectives:

1. To determine the population growth and productivity of the Wildhorse Island bighorn sheep population.
2. To measure and evaluate lamb and yearling survival.

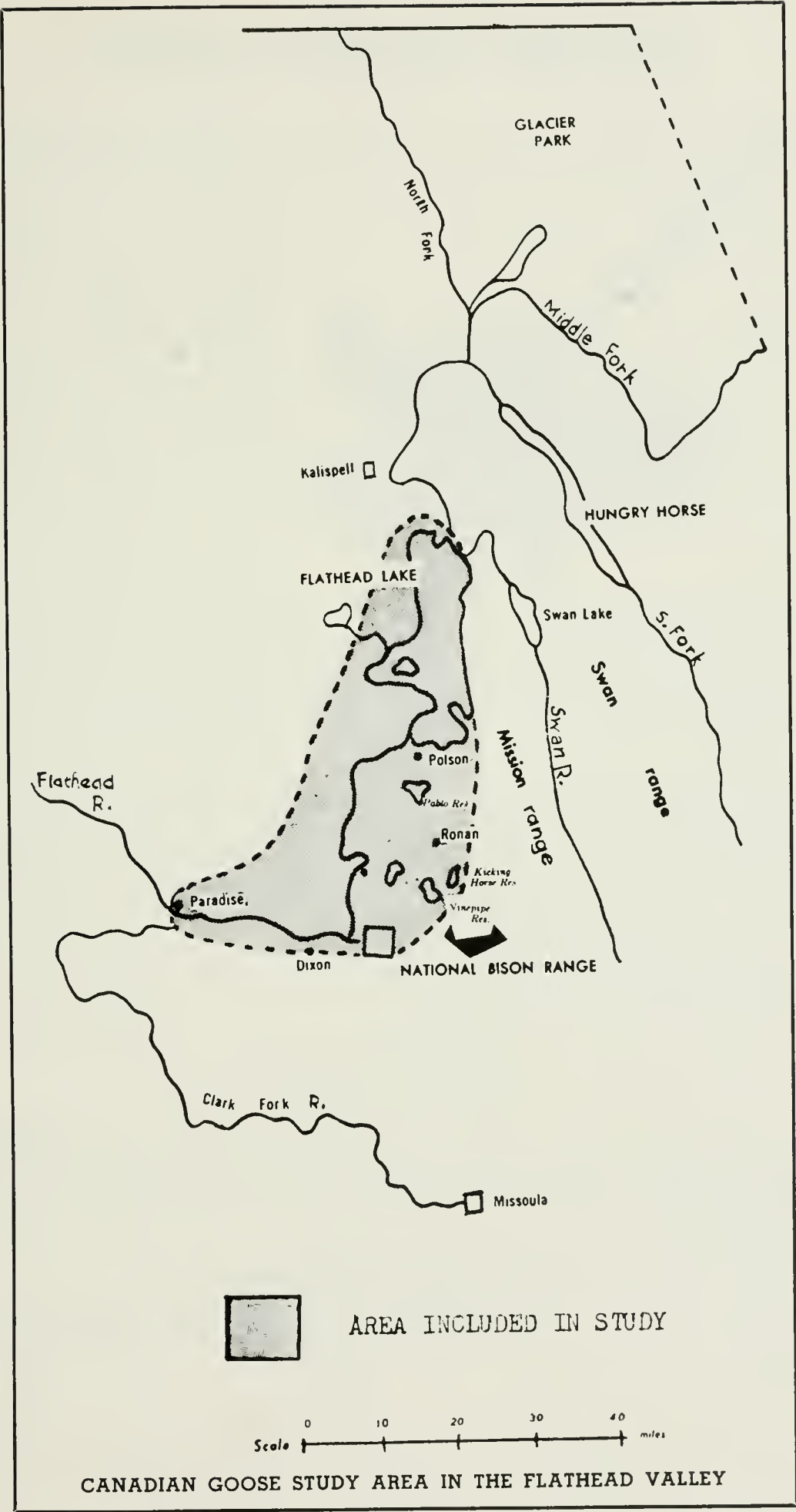
The findings from this project have been of particular interest and value to the management of bighorn sheep not only on Wildhorse Island but on the several additional important ranges throughout the State. This work also indicated the availability of bighorns from this particular range for transplanting purposes in the development of new herds.

BIOLOGY OF CANADIAN GEESE IN THE FLATHEAD VALLEY OF MONTANA

Objectives:

1. To determine the total nesting population of Canada geese in the Flathead Valley by means of aerial and ground census techniques.
2. To determine productivity of Canada geese in the Flathead Valley through extensive population survey and intensive nesting studies in areas of high nesting concentrations.
3. To determine factors affecting nesting densities such as habitat and human activity.
4. To evaluate environmental resistance factors including weather conditions, water levels and predation.
5. To gather information on local and migratory movements of geese in the area through banding and field observations.
6. To determine total kill by hunters of geese in the area and to obtain information on hunting pressure.

In working out the answers to the various aspects of this program, the Unit has worked very closely with Fish and Game Department personnel. Findings have been and will continue to be of extreme importance in building up a waterfowl management program for this area.



GAME BIRD FARMS



Ring-Necked Pheasants

The game farm program in the State has undergone several changes in the last two years in an effort to derive the greatest possible benefit from the birds released. With less emphasis on attempting to release maximum numbers of birds, it has been possible to concentrate more on the quality of the birds released and on improved distribution methods.

Birds are now being retained as long as possible at the farms before being released. This pro-

vides a more mature bird with a better chance for survival after release. Also, as many roosters as possible are held for release just prior to the opening of the hunting season. Studies have shown that in this way, the greatest return to the hunter is realized. Birds are also held over the winter for release in the spring in areas where adequate breeding populations are lacking.

Pheasant distribution throughout the State is now determined according to the recommendations of field personnel based on the results of surveys made in the various areas, rather than an a county quota system. It is therefore possible for the Fish and Game Department to direct its efforts toward stocking areas where (1) no natural stock is present but where conditions appear to be suitable (2) resident populations have been depleted or (3) heavy hunting pressure in areas with low pheasant populations makes it advisable to release roosters just prior to the hunting season.

During the last two-year period, the Department operated pheasant farms at Billings, Fort Peck, and Warm Springs.

Chukar Partridge

The Department has continued to increase its efforts toward establishing chukar partridge hunting in the State. The Moiese Game Farm was reopened during the Spring of 1952 to raise chukars and has been operated as a chukar farm since that time.

GAME FARM PRODUCTION

	Ring-necked Pheasants	Chukar Partridge
1952-1953	33,723	673
1953-1954	25,675	1258
Totals	59,398	1931

PREDATOR CONTROL

Control of predatory animals has historically been one of the initial steps in the development of a game management program in most states. Since certain predators utilize game species for a portion of their diet, it seems to follow logically that if man wants these species for his own use, he should eliminate the predator. This line of reasoning is, however, not entirely correct since there are many other factors associated with game abundance.

It has been shown, for example, that when ringnecked pheasant populations decline this decrease is noted not only in the areas where predatory animals abound but also in island habitats where there are no land predators. In other words, it is recognized that lack of protective cover, food shortage, disease and numerous other factors may have a far greater limiting effect on some species than do predators. Thus, in game management it is essential to evaluate the point beyond which predatory control becomes an expensive and ineffectual tool.

Another consideration, of course, is the relative reproductive potential of a species. It is undoubtedly true that predation has a greater effect on the larger game animals such as deer and antelope which reproduce at a slower rate than it has on those species which propagate more rapidly. The problem is most complex since it often involves unknown factors in what is commonly called the "Balance of Nature."

Fish and Game Department participation in predator control activities were accomplished in two ways during the biennium. First, by direct payment of bounties on certain species and second, by cooperation with the Predator Control Board.

Bounty payments were raised from \$25.00 to \$50.00 on mountain lions shortly after the biennium started, and a \$2.00 bounty was paid on bobcats. The bobcat bounty was temporarily increased to \$5.00 for a period of slightly over a year during the biennium, and then reduced to the original \$2.00 payment.

The Department also assisted in magpie and crow control by paying up to 5 cents for each bird killed when local sportsmen's groups matched this with a similar amount.

Cooperation with the Predator Control Board continued during the past two years. This board consists of representatives from the Montana Fish and Game Department, the U. S. Fish and Wildlife Service, the Montana Woolgrowers and the Montana Livestock Association. Each contributed a portion of the cost of controlling predation, and control operations are handled by the Predator Control Division of the U. S. Fish and Wildlife Service.



FISHERIES



A NEW LOOK AT FISHERIES MANAGEMENT

Introduction

It is undoubtedly true that every sportsman and interested person desires the assurance that fisheries management in the State of Montana is based on sound principles that will be productive of results. Undoubtedly the greatest single contribution to fisheries management made this biennium by the Commission and its staff of fisheries men with the support of the sportsmen is the "new-look" they have taken at the program and the selection they have made of "sound principles" for guiding the program.

To say that a scientific approach has been chosen sounds pedantic, but actually it is not. It is no more than putting trained or experienced men to work who will act without bias, without prejudice, and without interest in personal gain. As these men work and make observations, they keep precise records; they let the facts from these records speak for them. In addition they make the facts from these records available to other fisheries workers throughout the world, and they, in turn, keep informed of facts produced by work elsewhere.

This "new-look" at fisheries management has been made for just one purpose: to determine the causes for declined fishing success so that a sound program may develop to meet the changing needs. A great deal has been learned about the decline in fishing success and a program is being developed to hold the quality of fishing at as high a level as possible. The Fish and Game Commission has jurisdiction over very few of the factors which affect fishing; therefore this program can be developed and can proceed no

faster than it is understood and accepted by the public, by other state agencies, by federal agencies, and by various private and public organizations.

The picture which has developed during this biennium is presented herein. The reader, however, must keep two thoughts foremost in his mind.

First, fisheries management is a changing science, and the fisheries resource is a changing resource. Those interested in the resource must consider it with an open and flexible mind that is capable of adjustment to the changing conditions and newly acquired scientific facts.

Second, concepts change as well. While the Indians and early settlers regarded fish as a food source basic to their survival, fishing later developed into a pastime, a hobby. Increasing numbers of people followed the sport, but fishing was subordinated to all other water uses as one of little importance. However, fishing being a particularly desirable type of recreation has attracted an ever increasing number of anglers, so that from this sport a major industry has developed. The recreational industry has become so interwoven into Montana economy that fishing is gaining a place as a beneficial use of water on a level with other water uses.

While the financial and industrial aspects of fishing are important, these are subordinated by certain intangibles. For example, its effect on the moral fiber of citizens is great and among those who fish are found almost no juvenile delinquents and very few adult criminals. It is an especially beneficial form of relaxation of unmeasurable worth to the health and welfare of the people.

If recreational fishing is to see an orderly expansion so needed by Montana and so natural to the state, those whose actions and decisions affect it must act without prejudice, deceit, or partiality, or desire for personal gain with the total welfare of the people foremost in mind.

Fish Stocking and Management Policy of the Montana Fish and Game Department

General

1. The Fish Stocking and Management Policy hereby established shall constitute the official directions regarding the management and planting of fish in the State of Montana. All personnel acting under the jurisdiction of the Montana Fish and Game Commission shall comply with this policy. The provisions contained herein shall supercede all others and changes may be made only with the approval of the Montana Fish and Game Commission, the Superintendent of Fisheries and Chief Fisheries Management Biologist of the Montana Fish and Game Department.

2. No state or federally raised fish shall be planted in any water of Montana where public access is denied, except as provided for under Pond Planting and Management or under Planting and Management of Waters Affected by Natural or Artificial Disaster.

3. The Five-year Fish Distribution and Management Plan shall be revised to conform with the provisions of the Stocking and Management Policy and shall hereafter be known as The General Fish Distribution Plan.

4. The General Fish Distribution Plan shall be changed only with the written approval of the Superintendent of Fisheries and the Chief Fisheries Management Biologist of the Montana Fish and Game Department.

5. No plant of fish shall be made in any water of Montana not specifically designated for planting in the General Fish Distribution Plan without written approval from the Superintendent of Fisheries and the Chief Fisheries Management Biologist of the Montana Fish and Game Department.

6. Experimental plants of any species of fish, of any size, may be made in specific waters for specific purposes where there is no danger of damaging that water or adjacent waters from a fishery standpoint. Such plants of fish must be made by the conservation personnel responsible for the fishery management of the waters wherein the fish are planted and must first be approved by the Superintendent of Fisheries and the Chief Fish-

eries Management Biologist of the Montana Fish and Game Department.

7. Eastern brook trout shall be reared, as need for stock arises, at one only of the following state or federal fish cultural stations: Big Timber, Lewistown, or Great Falls.

Stream Planting and Management

1. The provisions of this section shall apply to all streams except as provided for under General or Planting and Management of Waters Affected by Natural or Artificial Disaster.

2. Only grayling, rainbow or cutthroat trout shall be planted in the streams of Montana.

3. Cutthroat trout and grayling shall be given preference in stream plants where they are likely to become established.

4. Rainbow trout plants shall not be made in predominant cutthroat trout populations and cutthroat trout shall not be planted into predominant rainbow trout populations.

5. No rainbow or cutthroat trout planted in streams shall be less than six inches long (total length).

6. Fish placed in streams shall be planted at locations readily accessible and used by the angling public.

7. Fish planted in streams shall not be placed in any stream location closer than one-quarter stream miles from portions of the stream where public access is denied.

8. The number of fish planted in any stream shall be dependent upon the fishing pressure exerted on that stream; the more heavily fished streams receiving greater numbers of fish.

9. Continued plants of fish in any stream shall be dependent and based upon a reasonable return of the planted fish to the creel.

10. Stream plants of fish shall not be made until after the opening of the general fishing season and not later than August 15th in any calendar year.

11. Stream plants of fish shall be made frequently and repeatedly in streams warranting such plants.

12. Streams warranting plants of fish shall be stocked each year.

Lake Planting and Management

1. Only grayling, cutthroat trout, rainbow trout or golden trout shall be regularly planted in the lakes of Montana. Kokanee, lake trout and silver salmon may be planted in lakes where it is recommended by the conservation personnel responsible for the fishery management of the specific water and with the written approval of the Superintendent of Fisheries and the Chief Fisheries Management Biologist of the Montana Fish and Game Department.

2. Trout, kokanee, silver salmon or grayling planted in Montana lakes shall be advanced fry or fingerling, exceptions to be approved by the Superintendent of Fisheries and the Chief Fisheries Biologist of the Montana Fish and Game Department.

3. Lakes shall be planted only where spawning is non-existent or inadequate to provide a fishable population.

4. Not less than one-hundred fish shall be planted per surface acre of lakes. The number of surface acres shall be determined during the lowest annual lake level.

5. Continued plants of fish in any lake shall be dependent and based upon a reasonable return of the planted fish to the creel.

6. Fish planted in lakes shall be well distributed in the littoral zone.

7. Planting boats shall be used to release fish when planting accessible lakes.

8. Specific plants in specific waters by airplane shall be allowed when accomplished under the direction of the conservation personnel responsible for the fishery management wherein the fish are to be planted and with the written approval of the Superintendent of Fisheries and the Chief Fisheries Management Biologist of the Montana Fish and Game Department.

Ranch Pond Planting and Management

1. No pond in Montana shall be managed, from a fishery standpoint, by the State Fish and Game Department which contains less than one hundred acre feet of water and which has less than ten feet of depth over two surface acres during the lowest pond level.

2. Suitable ponds shall be planted with fry, fingerling or larger fish of a species determined to be best suited by

the conservation personnel responsible for the fishery management of the specific water and with the approval of the Superintendent of Fisheries and the Chief Fisheries Management Biologist of the Montana Fish and Game Department.

3. There shall be no minimum size restrictions applying to private trout ponds.

4. Size restrictions applying to warm water ponds shall be as follows: Ponds less than one-half acre in size shall not be planted. Ponds from one-half to three acres shall not be planted unless 50% of the pond area is at least ten feet deep during the lowest annual pond level. Ponds over three acres shall not be planted unless 20% of the pond area is at least ten feet deep during the lowest annual pond level.

5. All applications for fish to be planted in Montana ponds shall be submitted to the Montana Fish and Game Department and approval must be obtained from the Superintendent of Fisheries and the Chief Fisheries Management Biologist before any plants may be made.

6. Applications for securing warm water fish shall be approved only if submitted by pond owners or lessees.

7. The number of fish planted in the suitable ponds of Montana shall be based upon maximum survival and maximum return of the planted fish to the creel.

8. No black, yellow or brown bullheads (*Ameiurus*); yellow perch (*Perca flavescens*); or sunfish (*Lepomis*), with the exception of the common bluegill (*Lepomis macrochirus*) shall be planted in the ponds of Montana.

Planting and Management of Waters Affected by Natural or Artificial Disaster

1. Streams, lakes and ponds from which the fish population has been removed by natural or artificial disaster shall be planted with advanced fry or small fingerling trout or warm water fishes of a species determined to be best suited to the particular water, and not damaging from a fishery standpoint to adjacent waters, by the conservation personnel responsible for the fishery management of that water and with the approval of the Superintendent of Fisheries and the Chief Fisheries Management Biologist of the Montana Fish and Game Department.

2. Fish planted into such waters shall be widely distributed throughout the stream, lake or pond in which the population is to be established and they shall be planted in such a manner so as to obtain maximum survival.

Fish Hatchery And Fisheries Management

No fisheries management measure has been so completely accepted by the public as the liberation of artificially propagated fishes into the waters. No argument is more heated than that which arises every year among sportsmen, the department, and influential persons concerning allocations of fishes. Each area of the state endeavors to extract from the hatcheries its proportionate share or more of hatchery fish, regardless of the need, regardless of the results. To many, planting is the cure-all, the panacea to every fishing ill.

There has been a great deal of inconsistency in the thinking relating to the liberation of hatchery fish, particularly trout. On the one hand some fishermen believe that the natural productivity of the waters is almost zero, and if there is to be any fishing in a body of water, that body of water must be stocked. On the other hand, however, when these same fishermen are considering how many fish should be planted in a body of water, its productivity is believed to be unlimited; that is, the number of fish available at the hatchery is the only limit that should be set on the number planted. Many sportsmen feel there is food and space enough in that stream or lake to support any number of fish which may be planted. Research has shown both of these common concepts to be wrong.

As Montana's economic developments change the state's fisheries resource, every tool of management must be used to the greatest efficiency if the resource is to contribute a substantial degree to recreation. There is no cure-all to fishing ills any more than there is one medicine to soothe all human ailments. The fish hatchery if wisely used is an effective, although expensive, tool of management.

The greatest expenditure in the hatchery system is for the production of catchable size trout. The cost of these liberated in the streams and lakes of the state ranges from twenty-five to forty cents for each fish, depending upon the fish-cultural station where the fish is produced and the size of the fish at the time of planting. If only the lower value of twenty-five cents is considered, and if all planted fish were caught, any one fisherman could take only twelve fish a year to get value received for his \$3.00 bird and fishing license. This is less than the daily legal limit in most waters. And in so doing, he would contribute nothing to the cost of departmental administration, to the costs of law enforcement, to the costs of other forms of fisheries management, nor to costs of upland game bird management.

Three points become evident from this consideration of dollars and cents:

(1) Fry and fingerling size trout should be used in management rather than catchable size trout wherever practical; (2) Fish of all

sizes should be liberated at such times and in such a manner as to insure the greatest possible return to the creel; and, (3) Fish should be liberated only where they are needed for management and only where a reasonable return of the fish to the creel may be assured.

During the past biennium the personnel of the Fisheries Division have taken a new look at the hatchery planting program in the light of great quantities of scientific data which has been accumulated from Montana and elsewhere, and have drafted a policy statement to govern the use of hatchery raised fish. This statement, on pages 52-53, has been designated as the "Fish Stocking and Management Policy of the Fish and Game Department, State of Montana" and has been adopted by the Fish and Game Commission.

One who works in or is interested in fisheries management must approach the subject with a flexible mind. This is absolutely essential for two reasons: (1) The fishery itself is continually changing because of the influences of man and of nature; (2) The science of fisheries management itself is changing as new scientific data become available from research and investigation and as new management methods are developed. Thus as one studies the "Fish Stocking and Management Policy," he must bear in mind that it is based on present conditions and on the most current facts. As these conditions change and as current knowledge is expanded by new facts, the policy will be adjusted accordingly. The policy statement is reproduced in its entirety at the start of this section. Various principles should be borne in mind as one studies the policy statement.

Why Are Fish Planted?

There are four reasons for operating hatcheries.

(1) Where there are no game fish present or where it is certain that an introduced species of game fish will be more desirable or produce a more desirable sport fishery, the hatchery may be used to establish a population. Once the population is established, natural reproduction should be adequate to sustain the sport fishery; the hatchery task is completed.

(2) In lakes, ponds and some streams where there are no spawning grounds for an introduced population, or where existing spawning grounds are inadequate to produce fish naturally in a quantity to fill the carrying capacity of that body of water, fish may be planted on a sustained basis.

(3) In some streams existing spawning grounds are adequate to produce fish naturally in a quantity to fill the carrying capacity of the stream but the fishing pressure is so excessive that catchable size trout may be planted from a hatchery on a put-and-take basis, providing there is a reasonable return of these trout to the creel.

(4) Lastly, the hatchery has the role of an "ace-in-the-hole" to re-establish fish in waters where these have been removed by some natural or artificial disaster.

Of course, the most controversial of these points are number two and three as relates to trout. Many sportsmen feel that most of

the lakes and streams should be planted for the reasons stated in point two. There are a goodly number of lakes which do not have adequate spawning facilities to provide a maximum trout population under moderate fishing pressure. These should be planted. On the other hand, the spawning areas in streams are usually far more than adequate to provide naturally propagated trout in quantities to saturate the productive capacity of the stream. Hatchery fish put in

such streams are unable to compete with naturally produced trout, and a majority of them will die if they are not caught within a very short time after they are planted. Obviously, fry and fingerling trout cannot be harvested soon after they are planted. It would be most desirable if these fish could be planted to live and enter the catch at some later date, in fact, that has been the hope behind the liberation of untold millions of fish. From the best information available at the present time, it appears that this does not happen, and fisheries managers and sportsmen alike must be realistic in accepting this.

Since plantings of most streams cannot be justified under conditions stated in point two, can these streams be indiscriminately stocked for reasons stated in point three? Since the streams already populated with trout cannot be planted successfully with fish that are intended to live and grow for a considerable period of time until they are caught, the only alternative is that these fish be planted at a size where they are available to the angler immediately. This is put-and-take stocking.

From the consideration of economics given earlier, it can be seen that this type of fish planting can be done only at a heavy financial drain on the fishery program. Put-and-take stocking must be done judiciously and not indiscriminately. These trout must be planted in places, in such manner, and at such times that most of them may be caught in a relatively short time by the greatest number of fishermen. The planting policy is stated to accomplish this.

Policy Would Shift Emphasis From Stream To Lake

One of the intentions in the stocking and management policy is that emphasis will be shifted from stream planting to lake planting. Stream planting is expensive and return to the creel is poor. Smaller size fish may be planted in lakes with higher survival. In the past, lake management has not been given adequate attention, with the result that poor lake fishing has channeled fishermen to streams where naturally produced fish were more abundant and where fishing has been better. It is the desire now under this "new-look" at the fisheries resource to build up lake fishing to where it shoulders more of the fishing load.

In the past the numbers of trout planted in lakes has often been very low, even as low as one fish or less per acre. As these fish spread out over the area of the lake, they became so "dilute" that the chances of an angler encountering a fish were low, making fishing

poor. The stocking and management policy eliminates the possibility of such "token plants" being made in the future by stating that no less than 100 fish per surface acre shall be liberated. This figure is the minimum. The actual number planted per surface acre will depend upon the productivity of the water and the fishing pressure.

The policy statement takes into account that a great number of Montana lakes are so contaminated with undesirable fishes that results commensurate with the cost cannot be obtained by fish planting. This will be discussed in more detail under another section; therefore, it will suffice to state here that rehabilitation of such waters is an integral part of the over-all program.

Over the large eastern portion of the State of Montana, fishermen depend largely upon small stock-water reservoirs or ranch ponds, for fishing. It is desirable that the northern pike and other "warm-water" fishes which are shown to be well suited to these waters and which will reproduce in these waters be planted from the hatcheries. Many of the ponds will be managed for trout or walleyed pike. Neither of these fish will reproduce in these waters to any degree, but by the stocking of small fish in these ponds, excellent fishing can be maintained at a nominal cost.

General Fisheries Management

In pioneer days fish were abundant, the land had been only sparsely settled and developed, modes of transportation were slow, and methods of taking fish were crude and inefficient. Since those days the human population has increased and brought with it an increase in land use and development, modes of transportation have advanced so that any portion of Montana is only a day or less away from any other point in the State, and fisherman skills have developed greatly. The result of these changes has been that fishing success has declined. Why is this so?

Increased fishing pressure is given nearly all the credit for this decline, but can the fisherman himself be blamed for all the decline of today's angling success? The question can be answered with a resounding NO, although in most states, Montana included, the major part, if not all, of the fisheries program has been developed upon the theory that fishing pressure is the chief factor in declined fishing success. In this section the causes for this decline will be discussed as discovered by the "new-look" at the fisheries resource, together with the program which has been designed to retard, stop, and even turn the course of this decline in the resource.

Kinds Of Fish In The Waters

As Lewis and Clark wound their way through the waters of the Missouri River and its tributary drainages they found the only "game fishes" present in these waters were grayling, whitefish, and cut-throat trout. While they found other species of fish, it is important to note that they found no carp and no Utah chubs, nor did they

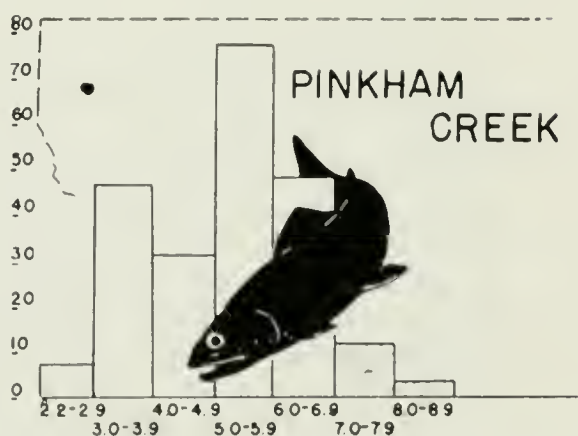
find perch, sunfish, or bass in these trout waters. As these explorers crossed the Continental Divide into the Columbia River drainage, their "game fish" list changed somewhat, embracing the cut-throat trout, Dolly Varden trout, and whitefish, but again carp, sunfish, perch and bass were absent.

Fishermen speak of fishing success declining since the "good old days" but in many instances they are not even talking about the same kind of fish. Many introductions of non-native fish have been beneficial, but many others have been harmful.

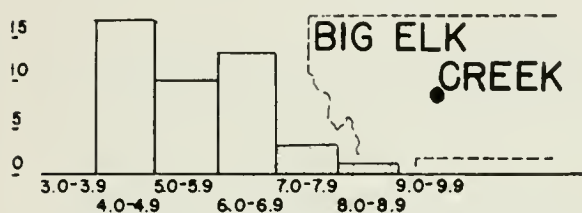
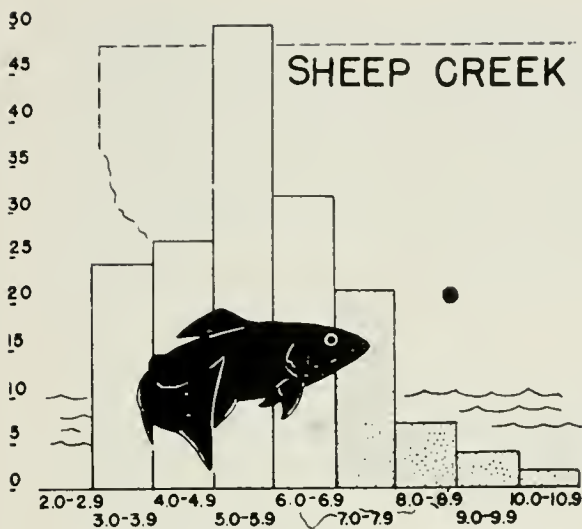
There are a great many instances of unwise introductions of fish, particularly rough fish. Game fish can be as undesirable as rough fish when they are found in habitats not suited to them. Perch, sunfish and bass have been introduced quite universally into some fine trout lakes and in a few of the larger trout streams such as the Missouri River. They do not do well in Montana on the whole from the fisherman's viewpoint. They grow slowly and become stunted, usually producing very large populations of fish that do not attain large enough size for fishermen to bother with. In competing with these fish, trout often fall off in abundance until fishermen all but quit using the water. Thus it is evident that fishing pressure cannot be blamed for poor fishing in this large segment of the State's trout waters.

Almost everyone is familiar with the presence of chubs in Hebgen Lake, carp and perch in the main stem impoundments of the Missouri River, carp in Dead Man's Basin Lake, carp and sunfish in Cooney Reservoir, and many other similar instances. These rough fish are not native to Montana and have contributed noticeably to poor fishing. Overabundance of some of the native rough fish also accounts for poor fishing. An example is suckers in Cooney Reservoir, Sutherland Lake, Lake Martinsdale, Harris Lake and many other waters. Adjustment in management measures, not reduction of fishing pressure, will again make fishing good in these waters.

The eastern brook trout has also caused many problems in Montana. These are not isolated instances, but are problems common to every bit of the trout waters in the western part of the State. The brook trout does well in a very few waters, particularly in the ranch ponds of Eastern Montana. Then, there are a few parts of the State, particularly in Central Montana, where the brook trout, while it does not do too well, is furnishing fishing where



Surveys conducted in Pinkham Creek, a tributary of the Kootenai River near Eureka, shows that the major portion of eastern brook trout in the stream were less than six inches long, at a time when the minimum length limit on this species was seven inches.



Research on Sheep Creek, north of White Sulphur Springs, and Big Elk Creek, near Two Dot, shows the large numbers of eastern brook trout which did not attain a length of more than 6.9 inches.

As a result of these studies, the seven-inch limit on eastern brook trout was removed.

enough to catch him. The average fisherman finds fishing poor in these brown trout waters, even though there are large populations of trout present.

In Rock Creek in Carbon County the brown trout constitutes 81 percent of the population of trout in the stream, and yet it makes up only about 45 percent of the catch. In Prickly Pear Creek in Lewis and Clark County, the brown trout constitutes about three-quarters of the population of trout in the stream, and yet makes up only one-third of the catch. The Shields River in Park County has been reported as being a very poor fishing stream, and yet this stream has been found to contain an average of 50 pounds of brown trout per 300 feet of stream, an extremely high population of fish.

Again it is evident in many waters that fishing is poor, not because of heavy fishing pressure, but in this case because the fishermen are not skilled enough to take browns even though large populations of brown trout are known to exist.

The program designed to alleviate the difficulties caused by unwise introductions of fishes is twofold: (1) To prevent unwise introductions and (2) To rehabilitate waters now containing undesirable fishes and to plant these with desirable fishes.

other trout would not do well at all.

Where eastern brook trout have been introduced and have established themselves, upwards of 90 percent of the population is below catchable size and does not contribute to the angler's bag. Fishermen prefer to fish elsewhere rather than catch tiny brook trout. An unwise introduction, not fishing pressure has caused the trouble. In fact, heavier fishing pressure on these small fish might help.

Brown Trout — Unwise?

While it would be a very bold statement to say the brown trout was a completely unwise introduction; nevertheless, it has caused trouble. It was not even native to the United States, but was brought here from Europe. Native species have declined in abundance wherever it has been established. It is a good fish, but the average fisherman is not skilled

In some parts of the state minnow fishing (use of small fish for bait) has been a chief factor in unwise introductions. This is a popular means of taking fish, and regulations prohibiting the use of small fish for bait are often given a great deal of opposition. Fishermen in Western Montana have seen the danger of introductions by minnow fishing and have given the support needed by the Commission to prohibit the use of minnows for bait in this area.

Many fine waters in the balance of the State are in jeopardy of being contaminated year by year through this means. Until fishermen realize that they can catch fish by other means, and in so doing, keep these waters clean for their own later enjoyment and for the enjoyment of future generations, restrictions cannot be placed successfully on this type of fishing.

Other steps which have been taken to eliminate unwise introductions are given elsewhere in this report under "Fish Stocking and Management Policy of the Fish and Game Department, State of Montana" on pages 52-53.

The second step being taken to correct the problem of unwise introduction of fishes is rehabilitation of waters. This is simply the introduction of a material, which is toxic to fish, into the water in such a manner that all fish life in that body of water will be killed. When that water again becomes non-toxic, it is restocked with a suitable fish from hatcheries. This is an excellent management measure and has been much used



Rehabilitation of a Montana lake by aerial distribution of toxicants.

throughout the United States with great success. It is costly, but if reintroduction of undesirable fishes can be prevented, the long-term benefits far outweigh the costs.

Most rehabilitation work has been done on lakes where there is no possibility of undesirable fishes moving up or down the drainage into the lakes and reinfesting them. Recent experiments have shown that streams may also be rehabilitated, providing natural or artificial barriers are present or constructed to prevent fishes from moving into the rehabilitated area.

Because rehabilitation of waters can be justified in Montana only where there is reasonable assurance that reintroduction of rough fishes will not be made, waters will be rehabilitated only in those parts of the State where use of small fish for bait (minnow fishing) has been prohibited.

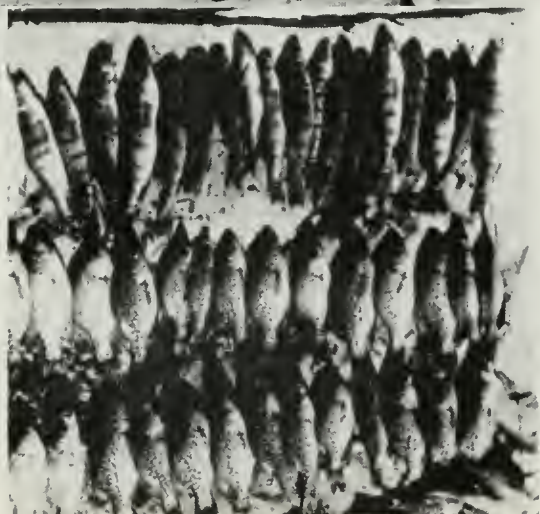
Stream Habitat

Until the last decade or so, and even at the present time to some extent, there was the popular belief that fish needed no more than



Sucker and carp predominate in the rough fish washed ashore (above) after poisoning. When this lake becomes non-toxic to fish, it will be stocked with desired game fish.

(Insert at left) — Stunted perch and sunfish removed by poisoning from once-good Montana trout lake.



water to thrive. It is now realized that there are other needs, and the productivity of the fishery resource depends to a great extent upon the degree to which these needs are provided.

Fish must have water of proper temperatures and the water must contain suitable chemicals in the proper amounts. Since the bulk of the fish caught by anglers are produced by nature, spawning facilities must be available. Food must be available in suitable amounts.

In stream habitats, cover and resting places are extremely important. The stream habitat is almost universally not under the jurisdiction of the Fish and Game Commission. The Commission is in the position of having been given the responsibility of managing the fisheries resource without having a word to say about what may be done to the habitat of that resource.

Thus, a sound program for fisheries conservation can be developed and can proceed no faster than it is understood and accepted by those who destroy the aquatic habitat. Municipalities and industries use the water heritage of the people as open sewers. State and Federal agencies as well as private individuals and corporations channel the meandering streams into open flumes without thought given to the fisheries resource to construct railroads and highways, to get water out of the State as rapidly as possible to prevent



GOOD STREAM HABITAT . . . Cover, resting places, well protected watershed.

floods, and in order to provide another acre of ground on which alfalfa may be raised or to consolidate a block of ground.

Ranchers often allow cattle and other livestock to have access to every inch of a stream, thereby denuding it of valuable cover and trampling down undercut banks. State and Federal agencies together with private corporations construct dams and impound waters that flood out hundreds of miles of spawning areas, destroy valuable trout stream fisheries, and in their places, provide artificial impoundments that are difficult, and sometimes even impossible, to manage as fisheries.

Irrigation waters are drawn from streams, leaving countless miles completely dry, and reducing the water flow in other hundreds of miles of streams thereby reducing the fish populations they contain.

These are the results of an increasing human population involving new and additional water uses. These have had drastic effects upon the fisheries resources and can in no way be related to fishing pressure as the cause of a declining fisheries resource. It is evident that the human population will continue to increase and that economic developments will be made at even a more accelerated rate than in the past.

Because this is evident and true, a general rule should not be pushed aside: A fishery can be no better than the aquatic habitat.



POOR STREAM HABITAT . . . Straightened to accommodate the highway at right.

Developments in the past have been haphazard and uncorrelated. Individuals, individual organizations, and individual agencies have destroyed fish habitats completely or lowered their productive potential drastically without thought being given to the results of such actions, not only on the fisheries industry, but on other branches of the economy as well.

Unless the general plan calls for an almost complete elimination of the recreational fishing industry of Montana, this State is in dire need of balanced planning in resource development.

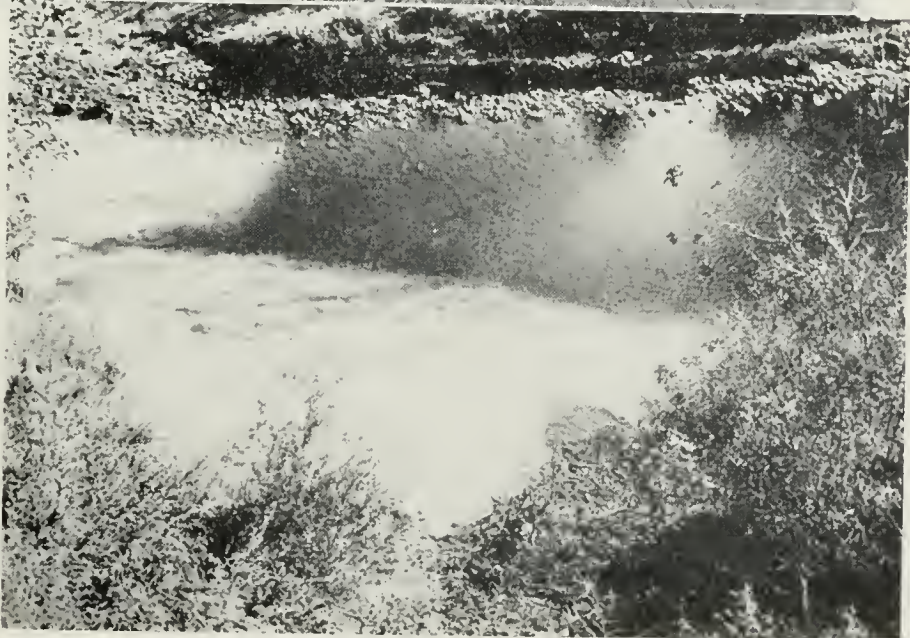
Pollution is not a major deterrent to the fisheries resource in Montana as yet. The potential for fish production is greatly lowered or removed in a few waters, but to date the over-all effects are not great. As Montana continues to develop, the threat from domestic and industrial pollution will become real. Since preventative measures are far more pleasant and effective than corrective measures, Montana is in need now of legislation that will provide adequate protection against pollution.

Straightening of stream channels has had a far more drastic effect on the aquatic habitat than has pollution to date. Every person who drives an automobile desires a good straight highway, but is it not possible in many instances to locate these highways away from stream beds? Have all of the other reasons for which streams are channeled into flumes been completely evaluated for their over-all effects? Every turn in a stream course provides a much needed hole. The natural banks of the streams, together with their overhanging brush, provide much needed cover and resting places. They also provide sources of food, for insects fall in large numbers from overhanging brush into the water and are consumed by the fish. Once a meandering stream is channeled into a flume with the banks shaped to engineering perfection, that stream is no longer a highly productive body of water from a fisheries or any other recreational standpoint.

This problem is also related to a similar problem of destruction of overhanging streamside brush from other causes. Consider the miles of streams along which the brush has been removed, not only by highway and road construction, but by cattle grazing, general agricultural practices, and flood control activities as well.

Experiments done by Marvin F. Boussu ("Relationship between trout populations and cover on a small stream," Master of Science Thesis submitted at Montana State College, June, 1954, and published in the *Journal of Wildlife Management*, Vol. 18, No. 2, April, 1954) have shown for Trout Creek in the Gallatin Valley that removal of brush alone, without making any other change in the stream, reduced the population of trout by 58 percent in the face of a general 36 percent increase in the population of trout in the stream.

Removal of undercut banks alone, without making any other change in the stream, reduced the population 33½ percent in the



Without adequate laws, Montana streams are subject to pollution as above.

face of a general 20 percent increase in the population of the stream. Changes such as these have been made on thousands of miles of streams in Montana and have made corresponding reductions in the trout populations. Again, here is a situation which has seriously and adversely affected the trout populations but which is related in no way to fishing pressure.

Construction of impoundments for storage of irrigation water, for generation of hydro-electric power, and for flood control is inevitable. When these dams are planned, fish should be given not simply consideration, but an active role. In the past, and unfortunately at the present also, the policy is to salvage some remnant of the fish resource after other interests have been given more than their share of consideration. Fish have not even been considered until after construction has been completed.

Hundreds of miles of good fishing water have been lost in the past to artificial impoundments, and additional hundreds of miles are destined for the same fate. Economic developments cannot be stopped to preserve recreational fishing, but a minimum of harm will be done to the recreational resource if the fisheries interests are given an active place in the planning of these water development projects.

In this manner those projects can be constructed first that will have the least damaging effects to the fisheries resource, and in this manner also, adjustments can be made in the plans so that fisheries can be benefitted to the utmost, consistent with the major purposes of the impoundments.

While it is essential that waters be diverted from stream courses to raise crops to feed the human population of the nation, nevertheless since the fishery habitat is involved, it must be examined along with other factors to determine why the fisheries have declined. The basic premise stated earlier was that fish need water.

How many miles of fishing streams in Montana have had all the water removed for irrigation purposes? These streams are removed from fish production. How many more miles of stream, while not completely dewatered, have had the normal stream flow greatly reduced by irrigation uses?

Fish can live in these streams, nevertheless the reduced stream size will produce a correspondingly reduced fish population. Waters must be used for irrigation; but fishing opportunities are thereby reduced and fishing success is also reduced. Civilization then, and not fishing pressure, is responsible for declined fishing success from these causes.

It would be desirable if the laws of the state were such that the Fish and Game Commission could create additional water by construction of strategically located headwater impoundments so that this water could be released into streams during periods of

heavy irrigation use and this water used solely for fish production; that is, if this water could be allowed to pass down a stream course without being diverted for other uses.

Lake Habitat

A lake and a stream are entirely different types of aquatic habitat; nevertheless, there are a great many similarities between requirements of fish in these habitats, and many of the arguments given in the previous section on streams are equally applicable to lakes.

In lakes, as in streams, fish require clear, pure water with suitable chemical balance. The lakes of the state are even less contaminated today with pollutants than are the streams, but the potential for such contamination is high as economic developments progress. As population pressures in Montana increase in coming years, anglers will become more and more dependent upon the State's lakes for their recreational fishing. Here again, Montana is in need now of legislation that will provide adequate protection against pollution so that contamination of the lakes of the State may be prevented. This will be far more fair and desirable than passing foul waters on to the next generation, thus forcing them to take corrective measures for their forebearers' negligence.

The stream fish populations of Montana are not any more subject to decimation from construction of impoundments than are lake fish populations. These fish are affected in two ways.

First, impoundments may be constructed so as to raise the natural level of lakes. Superficially it would appear that such impoundments would be beneficial in that they would increase the size of the lake and thus increase the size of the fish populations. Such impoundments are constructed, however, for water use. The level of the lake must fluctuate. If the fluctuations of the lake level amount to only a few feet, the lake may well be quite satisfactory for fish populations.

Montana has excellent fishing in many impoundments of this type. When the annual drawdown in the impoundments increased to from 25 to 100 feet as is common in many Montana reservoirs, it becomes impossible to maintain populations of fishes adequate for angling.

Second, dams may be constructed on streams tributary to lakes. Trout, most important in Montana, do not normally reproduce in lakes, but migrate out of the lakes and spawn in the tributaries. Such dams may well eliminate important segments or all of the spawning grounds upon which lake fish depend. Such has been the case with Flathead Lake where Hungry Horse Dam has denied many miles of valuable spawning grounds to the cutthroat and Dolly Varden trout which annually move out of Flathead Lake.

Thus with lakes as well as streams, it is important that the fisheries interests be given an active place in the planning of water development projects.

Natural lakes have not yet been affected greatly by having irrigation waters drawn from them. Now with the development of modern economical pumping units and spray irrigation, a potential danger has developed. Undoubtedly water will be pumped from Montana's lakes in increasing amounts. Maximum fish food production depends upon minimum fluctuations in lake levels and these lake levels will be drawn down drastically by such pumping units.

A certain amount of water could be taken from lakes without completely decimating the fish populations. The amount which could be taken would vary from lake to lake.

It would, therefore, be desirable if the Fish and Game Commission were authorized by law to file water rights on lakes important to the recreational fishing industry, these waters to be left in the lakes for fish production. Surveys could be made to determine how much water could be drawn from these lakes without affecting the fish populations drastically, and the Commission could then file rights on the waters below this level.

Water Sheds

The watersheds of Montana are inseparably connected with the fisheries resource. The populations of fishes can be no better than the aquatic habitat, and the aquatic habitat can be no better than the watershed upon which it is dependent for its water supply.

The ideal, of course, is no land use, for with virgin stands of grass and timber, spring run-off will be spread over longer periods of time and the largest proportion of water possible will filter into the ground to come out through the entire year as springs to sustain water flows.

Of course, civilization dictates that this ideal not be maintained. The land must be used. The more wisely it is used, the better will be conditions in the streams and lakes. Over-grazing, poor timber management, and other adverse agricultural practices all allow rapid spring run-off which in itself is damaging to fish populations and which also causes untenably low water flows in the streams through the balance of the year. Adverse watershed use in Montana is a major cause of declining fishing success.

This problem has a bright side. Water and soil are the very roots of mankind's existence. Ranchers must keep their all-important topsoil on their land. It's their life-blood. Then too, they must manage their land to permit a considerable amount of rainwater to soak into the soil, so the plants will have water in long periods between rains.

Over-grazing hurts the range; it reduces carrying capacity so that in the future less livestock can be raised per acre of land at the very time more is needed.

Water, racing down the stream beds and out of Montana in the spring, is of no value to Montanans for any purpose. In fact, it is commonly destructive, carrying with it the State's soil and even homes.

Impoundments have and can be built to retain these waters, but as watersheds continue to deteriorate, these impoundments will silt full even more rapidly than they are at the present time. Many of these are now inadequate to hold back spring floods, and will become less and less effective in the future.

Yes, there is a bright side in the relation of watershed to fish populations. People will realize that good, clear, clean waters with stable flows reflect a healthy economy and a prosperous people. Montanans will and must soon awake to the realization that the condition of their watersheds will spell the degree of their prosperity. A well integrated and intensive program of education by all concerned with water and land will speed the day's arrival when land users will look at the soil as their wealth.

Regulations

Regulation is one of the oldest and most used types of fisheries management. Like any other management tool, it can be only as effective as its use is sound. Too often in the past the intention has been to regulate the fishermen instead of the fish populations, and again there has been the intention of saving the fish instead of making optimum utilization of the fish. Remember that fish are a crop; a renewable resource that should be used. If they are not caught within a reasonable number of years after hatching they die of natural causes.

Even at this present time in Montana many fishing regulations are formed from ill considered opinions or wishful thinking. Unfortunately—or perhaps fortunately, depending upon one's viewpoint—fish do not behave as men reason they should. The Commission, in its "new-look" at the fisheries resource, is endeavoring to base its regulations on fact instead of fiction just as rapidly as the fishing public will allow this to be done.

Only those regulations which have a proven need should be imposed upon the fishermen. Regulations tend to become complicated and involved, and Montana's are no exception. Regulations are of little value unless they are obeyed, and the presence of an enforcement officer does not prevent violations when fishermen consider that regulations are needlessly complicated and of little value.

Laws are obeyed when respected. There are few people who would knowingly drive through a red traffic light, even though there were no traffic, and even though it were obvious that there was no traffic officer in the vicinity.

Then too, law enforcement and regulations are inseparable. The once imagined need for more and more law enforcement is not valid. The warden is an important figure in fish and game conserva-

tion, and he will become an even more valuable figure. Emphasis is now switching from detection to prevention. Prevention is brought about mainly, through a sound, practical fact-finding program to determine which laws and regulations are really needed, and through a sound, effective educational program aimed at enlightening the public to the need for the laws and regulations.

Creation Of New Waters

Montana has been greatly blessed in aquatic resources, but these waters are not evenly distributed over the state. In past years, large areas of new water have been created in the more arid portions of the state and have brought fishing to localities where fishing was not known. These impoundments have been built, however, for purposes other than fishing, usually for irrigation or for stock water.

Because of their primary purpose, they are often not well suited for fish and management of them is difficult. If these waters, and particularly those intended for stock water, had been designed for their basic use plus recreation, most of them could have been good fishing reservoirs.

The Commission intends to encourage the construction of ponds and reservoirs specifically for fish, designed and managed for this purpose, but not at the expense of valuable stream fisheries.

In addition, the Commission is planning to construct dams in areas lacking any or adequate fishing opportunities. Since these are expensive, the Commission can proceed only as funds are available. These impoundments will be specifically designed for fish. They will be landscaped and provided with facilities for highest aesthetic values in recreational fishing and will be managed to provide the maximum in fishing.

Habitat Improvement

Throughout this section on "General Fisheries Management," no mention was made of the management measure of stream and lake habitat improvement. This is a management tool that Montana may some day use. But right now Montana is wealthy in recreational fishing opportunities.

Its wealth is in its aquatic habitat, in its watersheds, and in its waters. These can be preserved easily and readily. Habitat improvement is costly and relatively ineffective. It is hoped that efforts will be directed so that Montana will not be forced from dire poverty in natural resources into habitat improvement which is no more than rebuilding what has been destroyed.

Access To Fishing Waters

As has been pointed out in other sections of this report, many of the factors which affect the fisheries resource most are not under the control of the Fish and Game Commission. One of these was the aquatic habitat itself in which the fish reside.

A large quantity of Montana's most productive waters lie wholly or in part within private lands, and sportsmen depend upon the good will of the landowner to fish these waters. It matters not at all the quality of fishing the Commission is able to provide if the public is denied access to these waters.

Every year sees an increasing amount of water denied to the public for fishing. While the lack of fishing is related to fishing pressure, nevertheless, it has not developed from the direct pressure upon the fisheries resource itself, but rather, from pressure of thoughtless and inconsiderate individuals upon the landowners.

A great deal of the land posted in the state has been posted for just cause; however, it is only fair to note also that the public is denied access to much water for no reason other than that the landowner desired to exercise his constitutional right as a landowner in denying anyone the right to enter.

Even though the Commission is expected to do so, it cannot begin to approach the problem of public access alone. It will continue to work on the problems of public access, and it will continue educational programs. The one great, potential source of energy which has directed little effort toward solution of the problem is the sportsmen themselves, both through organized sportsmen's clubs and through other civic groups and service clubs. The Commission plans to expand its encouragement of these.

**Commission Can't
Solve Access
Problem Without
Cooperation**



One solution to access problems is construction of stiles to avoid trampled fences and unclosed gates. Such construction is a worthwhile activity for any sportsmen's club.

A very few groups have already begun this program of improving relations between fishermen and landowners. This is one of the very best and most productive programs that a sportsmen's group or other organization can undertake in the interests of fish and game. They may initiate programs of education at home. They, better than anyone else, know the need.

They may work with the landowners in providing sanitary facilities such as toilets and garbage disposal facilities and in providing cattle guards, gates and stiles. They may further assist the landowner by providing him with signs and posters, by helping him to enforce closures of certain high-hazard areas in order that other areas on his land may be left open to the public.

Above all, they may aid in the program by sympathetically understanding the landowner's problems, whatever they may be, and patiently conferring with him to arrive at a solution.

Fisheries Management And Investigation

The operations of the Fisheries Management and Investigation Section of the Fisheries Division are financed largely through the Federal Aid in Fish Restoration Program, commonly known as the Dingell-Johnson Program.

During the 1952-53 fiscal year, ten Federal Aid projects were authorized and executed. While only eight were conducted in the fiscal year of 1953-54, this does not indicate that the program declined. Certain phases of the work were completed, allowing more effort to be put in the remaining projects.

A few of the highlights of the work accomplished by this section are briefly reviewed on the following pages.

Grayling Study

In the Biennial Report of the Fish and Game Commission for 1950-52, a review of the history and present status of the Montana grayling was given, together with an explanation of the need for investigation of this species. During this biennium the grayling study was completed and a report¹ of the findings has been published. The Montana Fish and Game Commission gratefully acknowledges the cooperative efforts given in this study by the Montana State College Agricultural Experiment Station and the U. S. Fish and Wildlife Service through the Red Rock National Migratory Waterfowl Refuge.

Management recommendations from the study were as follows:¹

"FISHING SEASON—It is recommended that the present fishing season (July 1 to September 15) be maintained and that Red Rock and Swan Lakes and that portion of Red Rock Creek on the waterfowl refuge be closed to fishing the entire

¹Nelson, Perry H. 1954. The American Grayling in Montana. *Journal of Wildlife Management*, Vol. 18, No. 3: pages 324-342.

year. This will give adequate protection for spawning grayling and permit a return to the Upper Red Rock Lake before fishing begins.

"DAILY LIMITS—It is recommended that the present limit of five grayling be reduced to two. The aggregate limit on cutthroat and lake trout should remain at 15 fish, not to exceed 10 pounds and one fish Size, number, and weight restrictions should be removed on rainbow trout, eastern brook trout, and whitefish.

"IRRIGATION—It is recommended that an investigation be made of legal 'water rights' for creeks entering the refuge. The most important would be Red Rock, Tom, Odell, and Metzel Creeks. The latter three are almost completely dewatered where they enter the refuge for certain periods during the summer.

"Control of irrigation on the refuge should be vested in the refuge manager. At present, water from lake tributaries (mainly Red Rock and Tom Creeks) is used to irrigate hay and grazing land leased to ranchers by the refuge. Irrigation should be curtailed wherever possible on the refuge, and no new developments should be permitted. Where permitted, irrigation should not begin before July 15 in order to protect the grayling spawners and fry.

"ARTIFICIAL STOCKING—The complete cessation of stocking exotic species into this area was recommended as early as 1950. This recommendation should be strictly adhered to. Only grayling and cutthroat trout should be stocked in the drainage above the Lima Dam. Further experimental stocking of grayling fry may meet with success. Stocking of grayling (six or more inches in length) in the more heavily fished waters such as Elk Lake, Odell and Red Rock Creeks would probably provide some grayling fishing.

"BEAVER CONTROL—It is recommended that all beaver and beaver dams be removed from tributaries of the Upper Red Rock Lake. Elk Springs Creek, part of Tom Creek, and six small spring creeks on the south shore of Upper Red Rock Lake have spawning areas not accessible to grayling because of beaver dams. Beaver dam removal above the last springs in Tom Creek is not recommended until a minimum flow of water is established by enforcement of legal water rights. Beaver dam removal without elimination of beaver on spring-fed creeks is useless since dams are rebuilt almost immediately. On Red Rock Creek no repairs to dams were observed until September. This allowed ample time for grayling to spawn.

"Red Rock Creek and its tributaries and part of Tom Creek were made accessible by removal of approximately 100 beaver and 90 dams in 1951 and 1952. Until beaver are eliminated from these areas, beaver dams will need to be removed prior to each year's grayling spawning run in order to keep the stream accessible.

"EROSION AND SILTING—Number and weight of all fish was lowest in Section 1 of Red Rock Creek where erosion of banks, and silting was prevalent. Perhaps after a more complete investigation, fencing of the creeks against livestock in this area might be justified.

"RECLAIMING WATER FOR GRAYLING—Culver (Widows) Pond, Buck Pond, and Shambow Pond contain rainbow and eastern brook trout at present. These fish should be removed by poisoning and grayling introduced. Buck Pond is the only one not at the head of its individual drainage. It has a small run-off from Elk Lake which can be isolated from fish movements by a coarse gravel fill¹ in the canyon at the lower end of the lake. If this is done, these ponds would be isolated and could be managed exclusively for grayling. They have some suitable spawning areas in their short spring inlets.

"Two ponds, located off the refuge appear suitable for grayling stocking, if permission can be secured from the owners to poison out the species present.

"It may be feasible to poison certain creeks but not without further investigation.

"MANAGEMENT IN OTHER AREAS—It is recommended that possibilities for enlarging the present grayling range be investigated. All barren mountain lakes which still exist in Montana and which are suitable, should be reserved for grayling only. A number of small mountain lakes already stocked with species other than cutthroat and golden trout might be poisoned out and then stocked with grayling. Headwaters of creeks that are isolated to upstream movement of fish by artificial or natural barriers offer an opportunity to develop grayling water. Over a period of years, it may be possible to reclaim a few entire creeks by poisoning and installing barriers to keep out other fish."

¹This earth fill was made during the summer of 1953.

Irrigation Diversion Study

During this biennium the irrigation diversion study discussed in the Biennial Report of the Fish and Game Commission for 1950-52 was completed. Two reports ^{1/2} were published and a pamphlet³ was printed by the Fish and Game Commission giving a brief discussion of fish losses in irrigation diversions and giving practical methods of reducing these losses. The Commission extends its grateful appreciation to the Montana State Agricultural College Experiment Station for its major role in this cooperative project.

The solution to fish losses in irrigation diversions has invariably hinged on fish screens or salvage operations. Many experimental installations have been tested by the Fisheries Division and in 1942 it was concluded that annual maintenance alone for a statewide screening program would cost three times as much money as was available for the operation of the entire Division.

In addition it has been demonstrated conclusively in the present study, at least for canals in the Gallatin Valley, that fish losses to any one canal are small enough so that conventional type fish screens cannot be installed and maintained economically.

Fish salvage is equally impractical because the high cost of crews and equipment does not permit the wide application necessary to effect an appreciable reduction of the over-all loss.

This study demonstrated that proper headgate manipulation can be expected to save as much as 35 percent or more of the pounds of trout lost to individual ditches. Reductions in water flow exposes fish and stimulates movement. Most of the fish so stimulated travel in an up-canal direction until they reach the river or find cover in the form of pools, undercut banks, or heavy overhanging brush. Fish travel greater distances whenever a uniformly smooth canal bottom and a minimum of cover exists. These observations have lead to the recommendation of two management measures:

1. It is recommended that all ditch companies reduce the flow in ditches abruptly three days prior to headgate closure in the fall, or at any other time during the year when headgates are closed. Shorter reduction periods are beneficial and can be applied anytime conditions favor decreased flow during irrigation season. The amount of decreased flow will depend primarily on the opening under the headgates. This opening should be not less than three inches high. If this spacing does not reduce the flow to the lowest level capable of sup-

¹Clothier, William D. 1953. Fish loss and movement in irrigation diversions from the West Gallatin River, Montana. *Journal of Wildlife Management*, Vol. 17, No. 2: pages 144-158, April, 1953.

²Clothier, William D. 1954. Effect of water reduction on fish movement in irrigation diversions. *Journal of Wildlife Management*, Vol. 18, No. 2: pages 150-160, April, 1954.

³Clothier, William D. 1953. Methods of reducing fish losses in irrigation diversions. Montana Fish and Game Department pamphlet, 5 pages.

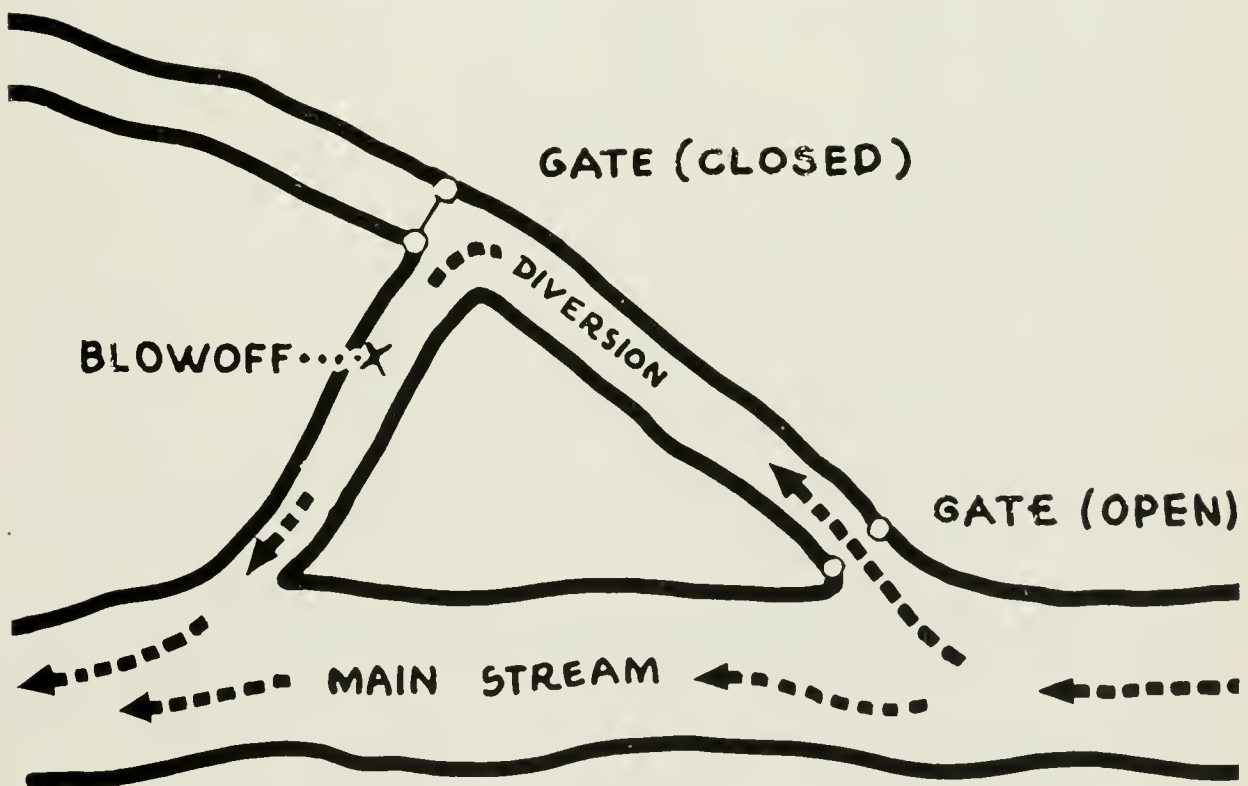
porting fish movement, a narrow high opening should be created by either modifying the construction of the headgate or blocking part of the flow into the canal with baled straw, boards or other suitable material.

2. It is recommended that holes be filled and brush cover or undercut banks be removed to stimulate a greater number of fish to move to the river. This is especially important for the area immediately behind the headgate. It is of little benefit to stimulate fish to move one or two thousand yards up a canal only to have them find suitable concealment just short of the river. A project of cover removal can be accomplished through the cooperative efforts of both sportsmen and ditch companies.

Many ditches have two headgates—one at the point of diversion and the other some distance down the canal. The downstream headgate regulates the flow into the canal proper and surplus water at this point is by-passed back to the river through a blowoff.

Wherever this condition exists, a third measure to reduce fish losses can be applied. If the upstream headgate and by-pass are opened one or two weeks prior to the irrigation season, some resident fish in the vicinity of the intake structure can be transferred from the intake back to the river downstream from the point of diversion.

The proposal is based on the finding that approximately 80 percent of the pounds of trout and whitefish lost to the Keughen Canal in 1950 moved down the ditch during the high water period, and an even greater percentage (96 percent) was lost to the Low Line Canal in 1951 under similar conditions.

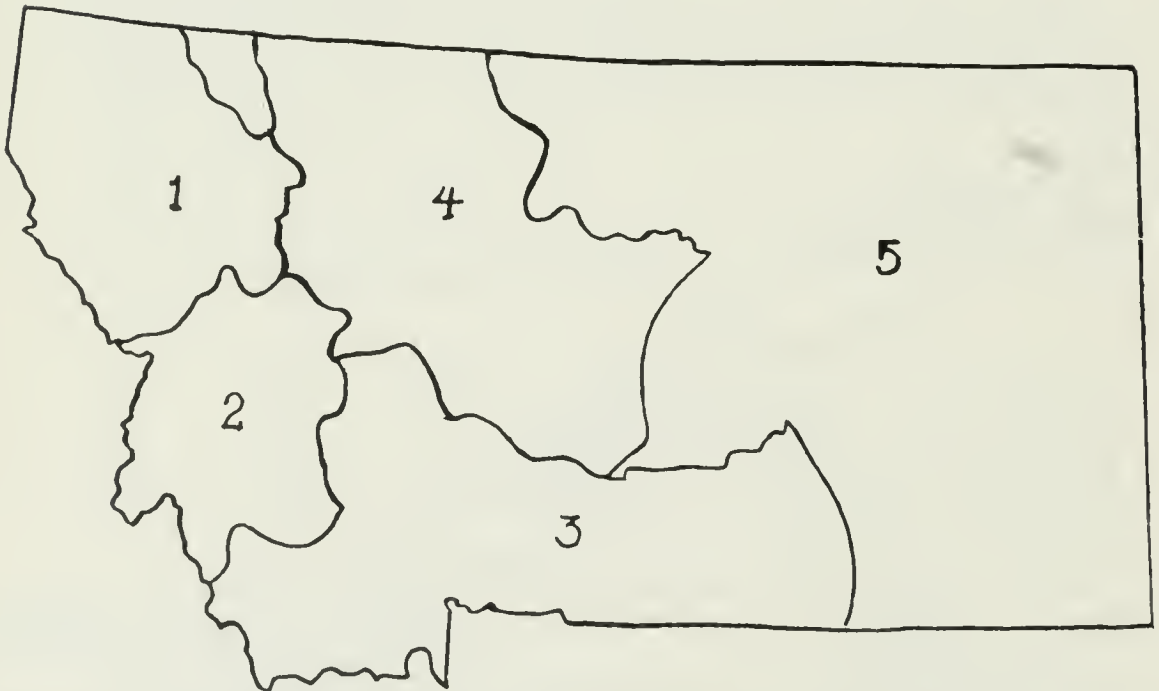


Fish Restoration Districts

The boundaries of Montana's fish restoration districts have been changed from that reported in the Biennial Report for 1950-52, as shown in the accompanying map. All five of the restoration districts are now active with two men each stationed in districts 1 and 3, and one man each stationed in districts 2, 4, and 5.

By constant observation and study, these men will know their waters and their needs. They will outline sound and substantial planting programs; will execute needed restoration measures such as habitat improvement, rough fish control, creation of new fishing waters, and acquisition and development of fishing areas for public use; and will formulate adequate and needed regulations.

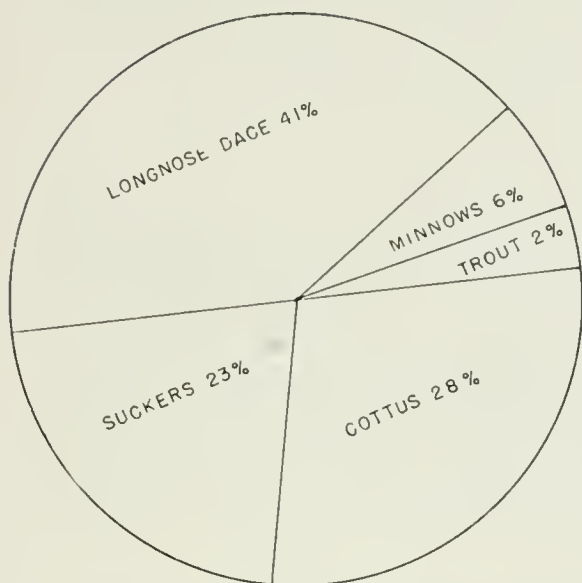
In the course of general survey work on the waters of district 4, the district biologist noted in Otter Creek, Judith Basin and Cascade Counties, that trout constituted only 2.3 percent of the fishes resident in the stream while rough fish made up the balance of the population as is shown in the accompanying graph.



MONTANA FISHERIES RESTORATION DISTRICTS

This survey demonstrated that, while most certainly any trout fishing at all must be dependent upon hatchery plantings, nevertheless because of the large population of rough fish present such plantings would be futile. As a result of the survey, in late summer of 1953, 500 pounds of a commercial toxicant were introduced into the stream in an experimental rehabilitation project.

In the case of Otter Creek, which empties directly into Belt Creek, undesirable fishes will be able to move again into the rehabilitation area. The plan here was to stock the rehabilitated area, as has been done, with brown trout while there were no rough fish present. Rainbow and brook trout were present before.



Percent of each group of fish recovered from sampled sections of Otter Creek, Judith Basin and Cascade Counties, Montana, August, 1952.

Observations will be made in subsequent years to measure the rate of recontamination by rough fish if such occurs, and to determine the economic feasibility of this type of management against the economic feasibility of continued plants of hatchery fish into large populations of rough fish.

In cooperation with the Montana State College Agricultural Experiment Station an investigation was conducted in this biennium in district number 1 on the relation between trout and yellow perch in Thompson Lakes. Total rehabilitation of this chain of lakes is not as yet economically feasible because of the combined area of the lakes. The native cutthroat trout populations of the lake did furnish excellent sport angling. With the introduction of yellow perch into these lakes, trout fishing has all but ceased. Kokanee have been planted and are furnishing the bulk of the still poor sport fishery.

It was noted in the study that during a short period in the spring, the yellow perch are concentrated on the shoal areas while the kokanee and cutthroat trout are in the deep waters. It was noted also that partial poisoning during this period along the lake margins and in the bays killed perch in large numbers at low costs without killing kokanee and cutthroat trout.

Based upon this work a further experiment has been planned for execution during the summer of 1954, whereby a concentrated effort will be made using fish toxicants to reduce drastically the perch population in one of the lakes by partial poisoning.

As soon as the treated area of this lake is non-toxic cutthroat trout fry will be planted into the shoal areas of the lake at a

rate of 300 per surface acre. At the same time cutthroat trout fry will also be planted into a second lake of the chain at the same rate per acre. The perch will not be poisoned in the second lake, leaving this lake as a control. The effects of this type of management measure will be noted and its economic feasibility calculated.

Bank Vs. Boat Fishing

As a result of excessive pressure placed upon the Fish and Game Commission by Flathead County sportsmen and sportsmen's groups in 1953 to outlaw the use of boats for fishing on the North Fork of the Flathead River, a study was undertaken during that summer to determine the relationship of angler's success by fishing with the aid of a boat as against that of the angler that did not use a boat. The Commission has the desire to formulate regulations needed for the fisheries' conservation, but it desires to keep those regulations to a minimum which are enacted for no other reason than to satisfy a local demand.

The Commission gratefully acknowledges the assistance given in this study by the Department of Zoology, Montana State University.

The following conclusions were drawn from this study:

1. The fishing pressure exerted by boat fishermen was small as compared with pressure exerted by bank fishermen. Likewise, the number of fish caught by boat fishermen was small compared to the number of fish caught by bank fishermen. Even though boat fishing becomes more popular in the future and there was a significant increase in boat fishermen, it does not appear that restricting this means of taking fish would be justified.

2. Boat anglers caught 31 percent of the fish while bank anglers caught 69 percent of the fish. Outlawing boat fishermen would not make the 31 percent of fish they caught available just to the present bank fishermen for two reasons.

First, it was observed many times that fishermen using boats would tie up to shore and fish from the bank, thus becoming a bank-angler. This would be entirely legal even though fishing from a boat were outlawed. A goodly share of the 31 percent of the fish taken by present boat fishermen would continue to be taken in this manner.

Second, if boat fishing were prohibited in the North Fork, a portion of the present boat anglers would simply fish from the bank as do other fishermen, and continue to take their share of the 31 percent in this manner.

3. While boat fishermen are more successful than bank fishermen, their success is not unduly high. The catch per hour for all random trout fishing creel census in the state is 1.2. Boat fishing success on the North Fork of the Flathead was 0.7 fish per hour.

4. There is little doubt that fishing success has declined in this river. Prohibiting fishing from or with the aid of a boat as a manage-

ment measure to improve fishing success would merely give anglers and fisheries managers a false sense of security. The true cause of the decline would not be found and would not be corrected.

Contribution Of Hatchery Trout Study

A four-year study was concluded this biennium on the lower 25 miles of Rock Creek below Red Lodge, Montana in district number 3. This section of Rock Creek is predominantly a brown trout stream. The study was designed to measure the contribution of hatchery reared trout to the total catch.

Approximately 20,000 yearling marked rainbow trout, averaging 5.4 inches in length, were planted each year prior to the opening of the fishing seasons in the years 1950, 1951, and 1952. These plants contributed 4 to 5 percent of the creel in the year planted and 7 to 8 percent of the creel the year after liberation.

In 1953 approximately 9,000 marked rainbows, averaging 7 inches in length, were planted after the start of the fishing season. These fish were liberated at points of access throughout the fishing season. This plant contributed 20 percent of the total fish caught during the 1953 season.

This study demonstrates the benefits that can be gained from following wise fish stocking procedures and demonstrates as well the absolute waste of money that does result from negligence in fish stocking.

Water Analysis

Brush Lake in Sheridan County, Montana, (district number 5) has a surface area of 200 acres and a depth of 57 feet. Fish have been planted at intervals in past years in a considerable quantity. No catch of fish has ever been reported. It is a beautiful lake and is located in a country that needs such waters for recreational fishing.

But before further plants of fish were made, the district biologist examined the water. Water analysis showed the lake to be highly saline. The most significant fact discovered, however, was the lake was almost devoid of dissolved oxygen. Fish could not live in water with only 0.5 p.p.m. dissolved oxygen, therefore further efforts at stocking the lake will be stopped. These fish may now be used in other waters where desirable results will be obtained.

Rehabilitated Lakes

During this biennium three lakes were rehabilitated, Savage Lake near Troy which was populated with sunfish and carp, Birkland's Reservoir near Fort Benton which was populated with bullheads, and Stewart Lake near Philipsburg which was populated with carp and yellow perch.

All will be planted with trout when they become non-toxic to fish. Special mention should be given to the Flint Creek Sportsmen's

Association of Philipsburg which contributed one half of the cost of the toxicant used in the rehabilitation of Stewart Lake.

Continuing Fisheries Census

During the biennium as in the past one, a program of fisheries census has been continuing in an effort to catalog the state's waters for fishery management use.

The program has two parts, creel census and direct stream and lake census. The latter census is done largely by the district biologists but every opportunity to gather such information is accepted by all members of the Fisheries Division.

The Fish and Game Commission again gratefully acknowledges the help given the Department in this program by the Zoology and Entomology Department of the Montana State College. Without the provision they have made for allowing the Department office and laboratory space, specialized equipment, and consultation with staff members, the Continuing Fisheries Census, particularly as relates to age and growth of fishes, could not have advanced to the stage of high value it has now reached.

Through the Statewide Creel Census phase of this program, information on fish catches is obtained at a minimum cost to the Department. The catch data is analyzed from punch cards and is used by fishery managers in outlining hatchery planting programs, in keeping a check on trends of fishing success, and in outlining the species distributions.

The greater part of the information is gathered by the Department's game wardens as they go about their regular duties of enforcement. This information is also furnished by cooperative sportsmen who enter their catch records in **Fishermen's Logs** and by a few guides and outfitters who are interested enough in the well-being of the fisheries resource to keep catch records.

In 1953 an estimate was made of Montana's total fish catch using information obtained from the Statewide Creel Census. This estimate was 11,182,000 fish of which 76.9 percent were trout, salmon or grayling; 10.2 percent whitefish; 5.2 percent food fish (bass, sunfish, perch, catfish, crappie, sturgeon, ling and pike); and 7.7 percent rough fish.

Fish Culture Program

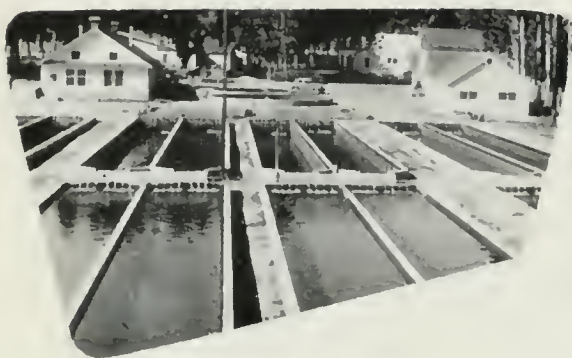
In Montana, as in other parts of the United States, fish culture is an important part of the fisheries program. The rearing and planting of fish in sparsely populated Montana, with its many miles of fishing streams and myriads of lakes, must of necessity be different than programs for the more heavily populated areas of the nation. It has been determined that the success of the fish cultural program depends upon the ability of Montanans to adjust their program to the existing conditions in the light of the best information available. The adjustments needed are discussed elsewhere in this report under the heading, "Fish Stocking and Management Policy".

The goal of the fish cultural program is to provide a net increase of fish to the fisherman's creel. During the past biennium, two major steps have been taken to accomplish this. First, to liberate fish in such manners, places, and at such times so that a maximum number is caught by the anglers. Second, to provide a higher quality fish for planting which is best adapted for survival. Fish planting programs are being changed continuously according to the latest information available. These revisions are made by Department personnel in cooperation with various sportsmen's organizations.

It has been the practice to measure the cost and success of hatchery operations in pounds of fish produced. While Montana is concerned about production and cost of production, nevertheless the greatest concern must be the cost of the end product, that is the fish returned to the creel. If in some waters optimum results can be obtained most economically by liberating small fish, this should be done. If economical results can be obtained only by planting catchable-sized fish, this should be done. The "Fish Stocking and Management Policy" has been designed to bring Montana fish cultural practices to the greatest level of success at the least cost.

Under the fish cultural program, Montana has been divided into three areas. These three areas are under the direct supervision of hatchery field superintendents, who, in addition to their supervisory positions, each operate one fish cultural station. These men have had much experience in hatchery programs, having been employed in the Fish and Game Department for periods ranging from 26 to 32 years.

ANACONDA



The silver salmon (*Oncorhynchus kisutch*) has become an important fish in the management of certain Montana lakes. The eggs have been obtained from west coastal states, however, hydroelectric and other water developments in the Columbia River system have so lowered the supply of silver salmon that there is doubt whether Montana can continue

to obtain eggs from these sources.

Prior to this biennium, silver salmon eggs have been obtained from fish in Georgetown Lake and hatched at the Anaconda station. Fish reared from these eggs have been held at this station and during this biennium eggs were obtained from the resulting mature fish. This is the first time on record that silver salmon eggs have been obtained from brood stock which have spent their entire life cycle in fresh water.

The Anaconda station is of great importance to the hatchery system in the State, since it is used for collection and distribution of rainbow and cutthroat eggs for a large portion of the other hatcheries in the state. The Georgetown Lake and Willow Creek reservoir spawning stations are operated from Anaconda.

In addition to the wild eggs taken, the domestic brood stock of early spawning rainbow is maintained at this station.

All necessary maintenance was carried on at the Anaconda station.

FISH PLANTED FROM ANACONDA HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	32,120	4	960	Rainbow	24,164	4	540
	37,640	5	1,940		64,274	5	3,300
	43,368	6	3,680		19,996	6	1,700
	11,596	6½	1,240		9,082	*	1,410
	10,514	7	980		10,186	**	3,430
	5,600	8	1,120	Cutthroat	24,960	†	6
	156	**	290		16,320	1	12
Cutthroat	277,388	1	125.5		23,898	4	854
	59,131	4	1,290		27,800	5	1,120
Eastern Brook	640	2½	4	Eastern Brook	1,728	2	6
Brown	69,600	1	50		7,600	3	100
Silver Salmon	18,750	4	375		481	4	13
Grayling	900,000	†	23		13,875	5	375
	5,640	6	300		4,000	*	435
				Brown	18,800	1	40
					32,000	2	40
					19,228	4	460
				Silver Salmon	8,960	2	70
					57,600	3	450
				Grayling	1,790,366	†	146
					2,000	5	80
TOTAL - - - 1,472,143				TOTAL - - - 2,177,318			
12,377.5				14,587			

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

ARLEE

The Arlee Station has been plagued with a myxo-bacteria infestation in the water supply which caused annual losses as high as 80 percent in the fish production. During the biennium this difficulty was overcome, and the hatchery is producing a full crop of fish.



The Arlee Station also contributes to the egg production for other hatcheries with their brood stock of fall spawning rainbow that is used in the put-and-take hatchery program of Montana. The cost of this operation shows in the over-all costs of hatchery production and must be evaluated not against the cost of production of the hatchery itself but as a part of the over-all program in Montana.

All necessary maintenance was carried on at the Arlee Hatchery which included an installation of a new water supply line, and landscaping of the hatchery grounds.

FISH PLANTED FROM ARLEE HATCHERY

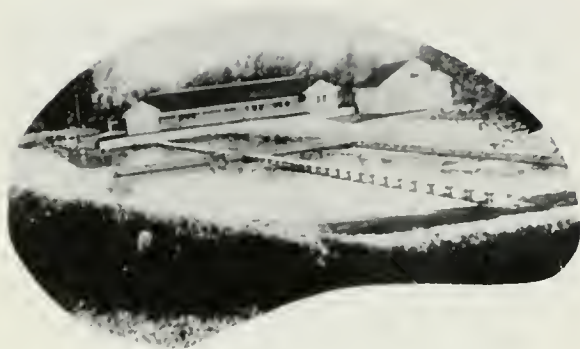
May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow -----	188,548	1	84	Rainbow -----	143,888	1	79.7
	25,960	4	618		70,520	2	172
	14,163	6	1,179		17,420	3	194
	8,046	*	1,150		21,826	4	424.7
	292	**	97.4		40,030	6	2,550
Cutthroat -----	265,232	1	77.2		14,588	*	3,100
	164,880	1½	70	Cutthroat -----	87,240	†	20
	14,640	4	337		145,096	1	56.6
	7,200	4½	160		17,457	5	529
	30,154	5	1,367		5,400	6	360
Eastern Brook ---	95,000	1	28	Eastern Brook ---	1,170	1	2
	50,648	1½	49	Sockeye Salmon..	100,224	†	76
	850	*	121.5				
Brown -----	53,800	1	32.5				
	8,521	5	367				
TOTAL - - -	927,934		5,737.6	TOTAL - - -	664,859		7,564

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

BIG TIMBER



During the biennium the management of the Big Timber station has been changed over to meet the requirements of fishing in the area. With the co-operation of the sportsmen, what was formerly a concentrated brown trout rearing program has been changed to rearing rainbow trout for put-and-take and for lake plantings within the area. Brown trout

are still being raised, but on a restricted basis realizing from actual samples and information derived from investigational programs that the brown trout is very well established and at the present time is in no need of assistance from an artificial program. The results of this procedure will be analyzed annually.

During the biennium the personnel have incubated and raised golden trout which were secured from lake stock near West Yellowstone and are now all being held as brood stock at the Hamilton hatchery where water is deemed most suitable for the propagation of this species. These fish, when finally in production, will be utilized in high elevation lakes where this species is well suited for reproduction and survival.

The Big Timber station incubates the eggs and rears the small trout for transfer to the Bluewater station at Fromberg where they are reared to legal size. The management of the Fromberg and Big Timber stations is closely integrated.

During the biennium the living quarters for the assistant foreman were completely repaired and put in top condition.



FISH PLANTED FROM BIG TIMBER HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	864	1½	2	Rainbow	10,400	1	13
	317,580	2	887		39,090	3	275
	54,000	2½	270		8,960	5	560
	11,840	5½	740		33,300	6	2,495
Eastern Brook	2,500	1½	3.1	Cutthroat	24,125	1	12.8
	49,000	2	140.3	Eastern Brook	6,268	2	67
	22,500	2½	100		3,265	4	51
Brown	123,552	†	36	Brown	38,950	1	41
	16,120	3½	260		33,100	6	2,980
TOTAL - - -	597,956		2,438.4	TOTAL - - -	197,458		6,494.8

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

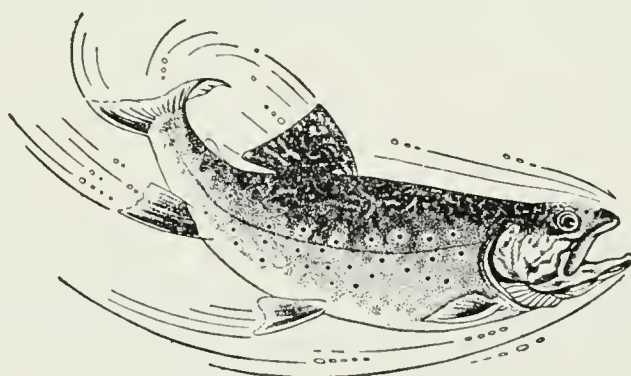
BLUEWATER

The Bluewater station at Fromberg was started in 1948 through the cooperation and interest of sportsmen, Fish and Wildlife Service and the Montana Fish and Game Department. Being a new station, many of the problems arising from construction and water-use had to be worked out.



During the biennium, in addition to the ten concrete rearing units previously installed, nine dirt rearing units were constructed and are now in production making a total of nineteen at the Bluewater station. The nine additional dirt raceway units were constructed at a cost which is almost equal to the cost of constructing two concrete-type rearing units.

In addition to the ten rearing units, new quarters for permanent personnel were constructed at the Bluewater station during the biennium. This was a needed development considering the expanded production of the station.



FISH PLANTED FROM BLUEWATER HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	10,260	4	190	Rainbow	213,350	4	6,380
	138,836	4½	4,501		7,048	5	360
	20,585	5½	1,170		480	6	40
Cutthroat	10,540	4½	340		9,686	*	1,150
	6,358	5	220	Eastern Brook	65,745	1	137
Brown	41,528	2½	179				
TOTAL - - -	228,107		6,600	TOTAL - - -	296,309		8,067

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

EMIGRANT



During the biennium the Emigrant station assisted the sportsmen of the Livingston area in the construction of a diversion canal to bring additional water to Dailey's Lake. After construction, a planting program using sockeye salmon and rainbow trout at a stocking rate of 200 fry and fingerlings per acre was initiated. Excellent fishing has been produced

for fishermen ranging from Butte to Billings.

No new construction was undertaken at this hatchery during the biennium. Routine maintenance was carried on.



FISH PLANTED FROM EMIGRANT HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	53,985	3	539.9	Rainbow	75,000	1	79
	2,500	4	59.5		28,600	3	465
	43,950	4½	1,463		43,940	4	1,490
	27,650	5	1,258		1,008	6	160
	1,000	8	166.7		1,002	**	334
	1,520	9	304	Cutthroat	59,600	1	23
Cutthroat	245,840	1¼	71.5		78,820	3	910
	80,000	1½	81.5	Eastern Brook	169,140	1	173
	16,346	3	163.5		80,160	2	159
Eastern Brook	67,000	1½	68.3		2,440	4	120
	20,000	2	52.4	Brown	76,500	1	90
	14,400	3	144		113,040	1½	108
Brown	149,600	1½	152.3		112,000	2	175
	15,300	2½	84.5		16,800	3	170
	26,188	3½	422				
TOTAL - - -	765,279		5,031.1	TOTAL - - -	858,050		4,456

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

GREAT FALLS

The Great Falls station, utilizing the water supply from the Giant Springs, is a very popular gathering place for local people and tourists and is the most visited fish hatchery in Montana.

During the biennium a new water supply tank which furnishes the water for the hatchery was constructed providing more storage and additional head for aeriating purposes.



One development in the Great Falls area which can be considered an outstanding accomplishment was the recreational program undertaken in cooperation with Augusta sportsmen and the State Water Conservation Board on Nilan Reservoir. The planting and resulting fishing in Nilan has been highly publicized and the fishing success has been outstanding.

A cooperative agreement was made on Bean's Lake between the Fish and Game Commission, Wallace Bean, and the Augusta Chamber of Commerce. Cooperative agreements, such as this one, have shown how harmoniously a landowner and sportsmen can work together and evolve programs of great value to the fishing public. This lake was planted from the Great Falls hatchery, and has been one of the state's outstanding fisheries.



FISH PLANTED FROM GREAT FALLS HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	230,400	1	76.8	Rainbow	40,770	3	302
	21,840	1½	39.0		37,560	5	1,780
	32,400	2	91.0		5,100	6	300
	1,200	2½	6		63,665	*	16,295
	12,498	3	124.5	Cutthroat	41,232	†	12
	20,000	4	460		10,120	4	240
	21,600	4½	720		5,120	5	320
	6,120	5	360	Eastern Brook	6,138	2	37
	6,000	7	820		26,034	3	232
	58,180	8	9,347.5		47,920	4	1,120
	18,730	*	3,960	Brown	15,940	6	1,180
Cutthroat	22,880	1	5.0	Silver Salmon	8,960	3	70
	47,504	1½	36				
	12,000	2	40				
Eastern Brook	17,440	2	40				
	516	3	2.3				
	45,350	4	985				
Silver Salmon	3,000	3½	60				
TOTAL - - -	577,658		17,173.1	TOTAL - - -	308,559		21,888

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

HAMILTON



It appears that water temperatures at the Hamilton station makes this hatchery the one most suited to holding golden trout brood stock. A brood stock has been developed at this station from eggs obtained from high mountain lakes near West Yellowstone. It is anticipated that the first eggs may be obtained from these fish in 1955. Eggs so obtained will be used for planting suitable high mountain lakes.

The Hamilton hatchery is a cold water station and is well suited for hatching eggs of fall spawning fish, such as the sockeye salmon. When these eggs are hatched at warm water stations, they are ready for planting too early in the year when lakes are still ice covered. Hatched at the Hamilton station, these fish are available for planting after the ice cover has gone from the lakes and when conditions are most suitable for survival of the planted fish.

Rearrangement of water supply pipes, construction of fish rearing tanks in the hatchery, and repair of sewage disposal facilities were carried out during the biennium together with necessary maintenance.



FISH PLANTED FROM HAMILTON HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	16,200	3½	270	Rainbow	2,500	3	25
	4,800	4	100		6,108	5	290
Cutthroat	8,488	††	2		2,380	6	140
	10,400	†	3.3		10,200	*	600
	187,620	1	62.7	Cutthroat	90,254	1	33
	30,900	1½	13.5		34,210	3	430
	27,600	3	290		24,542	4	485
Brown	38,400	1	12	Eastern Brook	3,498	3	33
	9,600	1½	5	Brown	95,814	1	42.5
TOTAL - - -	333,968		758.5	TOTAL - - -	269,506		2,078.5

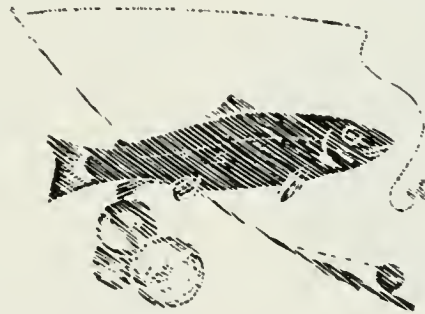
Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

LEWISTOWN

The Lewistown station is operating at full capacity and the Fish and Game Commission during the biennium purchased the Layman Spring water supply that may be used in later years for additional development in the Lewistown area. This spring is adjacent to the hatchery and investigations are being carried out as to utilization and development.



All necessary maintenance work was carried on during the biennium.



FISH PLANTED FROM LEWISTOWN HATCHERY

May 1, 1952 to April 30, 1953				May 1, 1953 to April 30, 1954			
Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	123,000	†	35.2	Rainbow	49,424	†	14
	11,460	2½	61.6		84,918	2	612
	63,620	3	636.2		32,140	3	502
	8,800	4	210		4,160	6	520
	30,400	4½	1,013		39,275	*	7,655
	43,290	5	1,968		24,760	**	8,120
	25,340	6	2,140	Cutthroat	46,000	†	10
	3,418	**	1,139.3	Eastern Brook ...	81,739	2	457
Cutthroat	54,500	†	15.9		23,800	3	135
	5,000	3	50	Brown	246,987	2	683
	3,600	4	85.7				
Eastern Brook ...	35,740	3	357.4				
	2,760	4	65.7				
	4,200	5	191				
Brown	117,740	3	1,177.4				
	6,200	5	281.9				
Sockeye Salmon ..	8,000	3	80				
	3,360	4	80				
Mackinaw	2,240	6	186.8				
TOTAL - - -	552,668		9,631	TOTAL - - -	633,203		18,708

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

LIBBY



The Libby station is now being fitted into the new program of lake planting. The area served by the Libby station contains many lakes where natural reproduction is negligible, and the production of this unit will fulfill the stocking requirements of these lakes.

Necessary maintenance was carried out during the biennium.

FISH PLANTED FROM LIBBY HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	80,750	1	24.5	Rainbow	33,200	1	36
	21,375	1½	15.8		5,000	2	8
	45,000	3	150		10,250	4	194
	5,000	4	80		20,000	5	800
	360	8	120		420	*	120
Cutthroat	221,400	†	56.7	Cutthroat	37,000	†	9.3
	206,200	1	77		10,000	2	40
	195,000	1½	115		30,000	3	300
	21,000	2½	70		8,250	5	540
	30,500	4½	610		3,500	6	280
	4,000	5	100	Eastern Brook	66,800	1	33.1
Eastern Brook	38,500	1	12		2,200	3	25
	8,560	5	380		3,150	4	90
	1,275	6	85		2,500	5	100
Mackinaw	30,000	1	10				
Sockeye Salmon	570,908	†	166.3				
Grayling	187,000	†	54.5				
TOTAL - - - 1,666,828				TOTAL - - - 232,270			
				2,575.4			

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

McNEIL

One of the greatest needs of the hatchery program in Montana is an adequate station for the hatching and rearing of walleye and northern pike. These species of fish are greatly needed for management of eastern Montana waters.

The McNeil hatchery located at Malta was constructed for this purpose some years ago, but it was not designed adequately to function as a pike rearing station. Ponds available cannot be drained or otherwise controlled as closely as needed for maximum production.

During this biennium consideration was given to steps which can be taken to develop the needed pike hatching and rearing facilities. Personnel adjustments were made and a study has been made of progress realized in pike hatching and rearing in Minnesota, Wisconsin and North Dakota. From these adjustments and studies steps will be taken soon to develop the facilities so greatly needed.

OVANDO

The Ovando station is operated as needed to fulfill the stocking programs in Montana above the regular hatchery load for the entire state. For the past biennium it has been used for the introduction of sockeye salmon in the Clearwater Chain of Lakes.

FISH PLANTED FROM OVANDO HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Cutthroat	11,520	†	8	Sockeye Salmon	839,719	†	231.5
Sockeye Salmon	969,344	†	262.1				
TOTAL - - -	980,864		270.1	TOTAL - - -	839,719		231.5

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

POLSON

The Polson hatchery has assumed great importance during the review of the fish cultural facilities in Montana. It is at this station that the major portion of kokanee for distribution in Montana has been propagated. The cold water at Polson retards the incubation period and also retards the fry development after hatching. This condition prolongs the time that kokanee fry swim-up and are ready for feeding and planting. Results of kokanee plantings following this practice have been successful and therefore it is necessary to consider Polson as an important unit in the fishery program of Montana. If warmer water were used, the kokanee would be ready to plant before the ice cover left many of the lakes.



Polson fish production cannot be evaluated on a basis of cost per pound of fish produced and thereby be compared with similar production costs of catchable-size fish at productive warm water trout stations. Polson does not produce catchable-size fish for put-and-take stocking as do the warm water trout stations. It produces "seed" fish at a time of year when they are needed for stocking.

FISH PLANTED FROM POLSON HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Cutthroat	464,890	†	135.3	Cutthroat	300,000	1	120
					17,500	3	182
Sockeye Salmon	1,164,000	†	339.5	Sockeye Salmon	1,548,800	†	352.5
TOTAL - - -	1,628,890		474.8	TOTAL - - -	1,866,300		654.5

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

SOMERS



The Somers station on the west side of Flathead Lake serves a hatchery district and is used for the rearing of native black spotted trout, grayling and sockeye salmon. This is a small unit which also fits into the over-all picture of fishery management in Montana.

There is little public access available on Flathead Lake. The station grounds are of great value, therefor, for providing to the public a means of ingress and egress to the lake. A boat dock was constructed this biennium for use by the public.

FISH PLANTED FROM SOMERS HATCHERY

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Cutthroat	21,145	†	6.1	Cutthroat	127,284	†	55
	339,128	1	104		331,886	1	166.2
	367,272	1½	232		33,572	3	360.2
	14,010	3	108.8		14,960	4	226
	34,420	4	686.4		2,812	5	74
	7,200	4½	160	Dolly Varden	1,500	2	8
Dolly Varden	4,080	2	6	Mackinaw	26,240	1	16.3
Mackinaw	31,200	1	15	Sockeye Salmon	1,026,235	†	220.1
	36,000	2	60	Silver Salmon	50,400	1	54
Sockeye Salmon	1,588,426	†	364	Grayling	2,642,000	†	59.3
Silver Salmon	38,700	2	94				
	3,500	2½	9				
	2,500	3	8				
Grayling	2,121,000	†	61.4				
TOTAL - - -	4,608,581		1,914.7	TOTAL - - -	4,256,889		1,239.1

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

U.S. Fish and Wildlife Service Cooperative Program

There are three federal trout hatcheries and one federal warm water fish hatchery in Montana. During this biennium, as in the past, the Fish and Game Department contributed monies to three of these stations to defray operating costs. This money so spent has been highly productive in fish planted in Montana waters. This cooperative program between the Fish and Wildlife Service and the Fish and Game Department is highly successful. These hatcheries are closely integrated into the fisheries program of the state, and are contributing a major part to the fish stocking of Montana waters.

FISH PLANTED FROM BOZEMAN HATCHERY

(Federal-State Cooperative)

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	38,540	2	140	Rainbow	822,710	2	1,610
	121,634	3	1,582		23,912	3	280
	77,390	4	2,130		56,275	4	1,431
	41,597	5	1,851		85,466	5	4,943
	30,010	6	2,320		26,332	6	6,195
Eastern Brook	29,800	3	294	Eastern Brook	170,165	3	1,838
	90,250	4	1,930	Brown	191,920	3	1,755
Brown	131,220	2	690	Cutthroat	80,582	1	93.5
	177,130	3	1,920				
Cutthroat	352,730	2	867.5				
TOTAL - - -	1,090,301		13,724.5	TOTAL - - -	1,457,362		18,165.5

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

FISH PLANTED FROM CRESTON HATCHERY

(Federal-State Cooperative)

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	24,514	1	29	Rainbow	16,848	2	54
	24,248	2	176		53,087	3	427
	4,857	6	870		800	4	20
	2,452	8	844		20,982	5	936
	510	9	150	Cutthroat	6,936	1	3
	102	**	408		22,008	2	24
Cutthroat	1,374,730	1	347		143,860	3	1,580
	170,054	3	1,334		167,552	4	3,431
	108,715	4	2,245		49,436	5	2,264
	45,800	5	2,920		41,924	6	3,398
	1,560	6	300		22,920	*	4,079
	4,782	8	1,406	Eastern Brook	9,000	3	200
	4,550	9	1,000		29,657	4	606
Eastern Brook	39,308	4	1,066		15,609	*	3,560
	5,700	5	350		1,025	**	360
	3,301	8	788	Mackinaw	7,788	*	967
	18	**	72				
Dolly Varden	2,278	3	34				
Mackinaw	12,450	3	166				
	15,360	4	384				
TOTAL - - -	1,845,289		14,889	TOTAL - - -	609,432		21,909

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

FISH PLANTED FROM ENNIS HATCHERY

(Federal-State Cooperative)

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Rainbow	43,646	2	50	Rainbow	244,000	2	1,945.7
	340,098	6	33,562		70,000	3	700
					220,176	4	3,388
					531,475	6	48,237
				Cutthroat	86,600	1	53.2
				Grayling	4,525	4	75.5
					6,000	5	200
TOTAL - - -	383,744		33,612	TOTAL - - -	1,162,776		54,599.4

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

FISH PLANTED FROM MILES CITY HATCHERY

(Federal-State Cooperative)

May 1, 1952 to April 30, 1953

May 1, 1953 to April 30, 1954

Species—	Number	Size	Weight	Species—	Number	Size	Weight
Bass, Lge. Mouth	23,900	3	275.3	Bass, Lge. Mouth	100	2	1
	38,900	4	775.3		10,875	3	110.4
Bluegill	26,150	1	16.8		7,925	4	197.4
	300	6	60		22,100	5	880.7
Bullhead	71,245	2	527.6		300	6	17.6
	400	6	100		1,450	*	72.5
				Bluegill	7,250	1	5.5
					223,025	2	1,451.5
				Crappie	350	2	7
				Walleye	1,092,000	†	21.8
					2,500	3	27.2
				Bullhead	35,900	3	329
TOTAL - - -	160,895		1,755	TOTAL - - -	1,403,775		3,121.6

Symbols Indicate: *Legal. **Adult. †Fry. ††Eyed Eggs.

Spawning Stations

Montana has within its borders several lakes and streams where natural runs of wild fish as well as fish which have been planted return to spawning stations for egg collections. In fact, Montana in itself is in an enviable position as it has within its borders the largest spring-run rainbow egg source in the United States.

In addition to being sources of fish eggs, spawning stations are a management tool. The magnitude of fish runs and the average weight and length of the fish in the runs are watched carefully. In this manner, fish population trends are observed and management measures are adjusted to maintain optimum fish populations. This program was started this biennium.

These stations are located at Willow Creek Reservoir, Georgetown Lake, Lake Mary Ronan, Little Bitterroot Lake, Rogers Lake, Flathead Lake and the South Fork of the Madison River near Hebgen Lake. At these stations are taken rainbow trout, cutthroat trout, brown trout, kokanee (sockeye salmon) and grayling eggs.

Eggs furnished to different fish hatcheries in Montana from wild stock and stock that are living under natural conditions make

them most desirable for use in Montana because the resulting offspring are adapted to life and reproduction in Montana lakes.

With the exception of fall-spawning rainbow eggs and a very few eggs from lake trout, northern pike and walleye pike, Montana is self-sufficient in this egg collection program. If this state were to buy the eggs (valued from \$2.00 to \$3.00 per thousand) which would be necessary to carry out this present program, the cost would be a heavy burden.

Distribution

Fish distribution in Montana is getting more attention each year. It becomes increasingly evident that large hatchery production figures mean nothing if, after fish have been reared in the hatcheries for several weeks to a year or more, the fish produced are taken to the lakes and streams of the state and hurriedly dumped into the water.

The main concern of individuals and organizations is over large hatchery production figures. Little concern is expressed over the number of liberated fish that reach the fisherman's creel. One of the weakest links in the fisheries programs has been in the distribution of fish reared.

Montana's current hatchery production will become relatively much greater as the fish distribution plans and systems are improved. Many times the number of fish will reach the creel under improved planting methods than are now being returned from present methods.



STATISTICS



**STATE FISH AND GAME DEPARTMENT
STATEMENT OF INCOME**

May 1, 1952 - April 30, 1953

Hunting and Fishing Licenses & Shipping Permits:

Resident Bird and Fish	183,770	@	\$ 3.00	\$ 551,310.00
Resident Big Game	116,566	@	2.00	233,132.00
Tourist Fishing	27,940	@	2.50	69,850.00
Non-Resident Fishing	5,017	@	10.00	50,170.00
Non-Resident Bird	262	@	25.00	6,550.00
Non-Resident Big Game	1,615	@	100.00	161,500.00
Shipping Permits	5,770	@	.60	3,462.00
Special Moose Permits	211	@	25.00	5,275.00
Special Antelope Permits	18,622	@	5.00	93,110.00
Special Elk Licenses	341	@	1.00	341.00
Special Deer Licenses	4,270	@	5.00	21,350.00

\$1,196,050.00
33,653.30

Less Dealers' Fees

Net Income from Sale of 1952 Licenses
1951 Accounts paid during above period

\$1,162,396.70
1,578.40

Total Income from Hunting and Fishing License Sales

\$1,163,975.10

Licenses and Permits Other than Above:

General Trappers' Licenses	809	@	\$ 10.00	\$ 8,090.00
Land Owner Trappers' Licenses	472	@	1.00	472.00
Beaver Tags	11,196	@	.50	5,598.00
Beaver Trapping Permits	1,068			14,840.00

(Permit for ten beaver \$10.00)
(Each additional beaver \$1.00)

Guides' and Outfitters' Licenses	198	@	10.00	1,980.00
Resident Fur Dealers' Licenses	49	@	10.00	490.00
Taxidermist's Licenses	10	@	15.00	150.00
Certificates of Identification	873	@	.50	436.50
Fur Dealer Agents' Licenses	22	@	10.00	220.00
Non-Res. Fur Dealers' Licenses	2	@	50.00	100.00
Minnnow Seining Permits	10	@	10.00	100.00
Alien Gun Permit	1	@	25.00	25.00

\$ 32,501.50

Miscellaneous Revenue:

Fines	\$ 34,815.50
Sale of Confiscated Fish and Meats	2,968.28
Other Revenue	793.35
Royalty on Beaver Sold	27.50
Additional Beaver Granted on Beaver Permits	224.00

\$ 38,828.63

\$1,235,305.23

Pittman-Robertson Income by Federal Reimbursement
Dingell-Johnson Income by Federal Reimbursement

268,567.92
57,134.01

TOTAL INCOME TO DEPARTMENT—May 1, 1952 to April 30, 1953

\$1,561,007.16

STATE FISH AND GAME DEPARTMENT

STATEMENT OF INCOME

May 1, 1953 - April 30, 1954

Hunting and Fishing Licenses and Permits:

Resident Bird and Fish	181,560 @ \$ 3.00	\$ 544,680.00
Resident Big Game	117,984 @ 2.00	235,968.00
Non-Resident 6-day Fishing	31,295 @ 3.00	93,885.00
Non-Resident Fishing	4,080 @ 10.00	40,800.00
Non-Resident Bird	149 @ 25.00	3,725.00
Non-Resident Big Game	1,607 @ 100.00	160,700.00
Shipping Permits	5,200 @ .60	3,120.00
Certificates of Identification	1,395 @ .50	697.50
Bow and Arrow	535 @ 2.00	1,070.00
Special Antelope Permits	23,677 @ 5.00	118,385.00
Special Moose Permits	142 @ 25.00	3,550.00
Special Mountain Sheep	30 @ 15.00	450.00
Special Mountain Goat	50 @ 5.00	250.00
Special Buffalo	3 @ 25.00	75.00

\$1,207,355.50
33,929.80

Less Dealers' Fees

Net Income from Sale of 1953 Licenses

\$1,173,425.70
4,872.20

1952 Accounts paid during 1953

\$1,178,297.90

Licenses and Permits Other Than Above:

General Trappers	1,069 @ \$ 10.00	\$ 10,690.00
Land Owner Trappers	370 @ 1.00	370.00
Beaver Tags	11,528 @ .50	5,764.00
Beaver Permits	796	11,559.00

(Permit for ten beaver \$10.00)
(Each additional beaver \$1.00)

Guides' and Outfitters' Licenses	123 @ 10.00	1,230.00
Resident Fur Dealers' Licenses	33 @ 10.00	330.00
Taxidermist Licenses	12 @ 15.00	180.00
Fur Dealer Agent Licenses	22 @ 10.00	220.00
Non-Res. Fur Dealers' Licenses	4 @ 50.00	200.00
Minnow Seining Permits	7 @ 10.00	70.00
Rough Fish Seining Permit	1 @ 50.00	50.00
Alien Gun Permit	1 @ 25.00	25.00

\$ 30,688.00

Miscellaneous Revenue:

Fines	\$ 37,781.37
Sale of Confiscated Fish and Meats	5,346.20
Other Revenue	106,317.39*
Sale of Confiscated Furs and Hides	7,214.35
Royalty on Live Beaver Sold	18.50
General Season Beaver Royalties	1,903.00
Additional Beaver Granted	217.00
Sale of Fish Eggs	4,140.00

\$ 162,937.81

Misc. Remittances direct to State Treasurer

2,354.74

Pittman-Robertson Income by Federal Reimbursement

\$1,374,178.45

Dingell-Johnson Income by Federal Reimbursement

283,801.03
99,591.52

TOTAL INCOME TO DEPARTMENT—May 1, 1953 to April 30, 1954

\$1,757,571.00

*\$100,000 received from Washington Water Power Co. for damage to Clark's Fork River fishery. Miscellaneous revenue and sale of fish eggs to California, Colorado and Nevada.

RECAPITULATION OF DISBURSEMENTS

May 1, 1952—April 30, 1953

COMMISSIONERS	\$ 6,393.85
ADMINISTRATION	95,800.99
PUBLIC INFORMATION AND EDUCATION	23,512.64
PREDATOR CONTROL INCLUDING STATE TRAPPER	57,892.32

MISCELLANEOUS:

Game Damage Expense	\$ 7,637.67
Shop and Warehouse	26,907.44
Printing Licenses—Maps	8,891.28
Refunds	958.30
University Research Unit	6,412.27
Appropriation to Purchasing Department	2,629.75
Other Field Projects	1,548.70
Insurance—Automobile, Buildings	1,513.56

TOTAL MISCELLANEOUS	\$ 56,498.97
ENFORCEMENT	285,399.89

FISHERIES DIVISION:

Hatcheries:

Anaconda	\$ 38,867.60
Arlee	21,604.14
Big Timber	14,441.48
Bluewater	28,428.90
Emigrant	16,635.99
Great Falls	29,687.75
Hamilton	15,299.97
Lewistown	31,830.17
Libby	25,490.13
McNeil	6,966.00
Ovando	5,756.80
Polson	8,650.03
Somers	12,782.15
Creston, Ennis, Miles City (Fed.)	13,575.76

Spawning Stations	\$ 6,820.41
Other Field Projects	83,869.93

TOTAL FISHERIES DIVISION	\$ 360,707.21
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GAME FARMS:

Billings	\$ 20,809.13
Fort Peck	17,589.60
Warm Springs	17,962.02
Moiese	4,529.06

TOTAL GAME FARMS	\$ 60,889.81
WILDLIFE RESTORATION DIVISION	333,553.35

TOTAL EXPENDITURES DURING FISCAL YEAR	1,280,649.03
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RECAPITULATION OF DISBURSEMENTS

May 1, 1953—April 30, 1954

COMMISSIONERS	\$ 5,750.67
ADMINISTRATION	109,017.51
PUBLIC INFORMATION AND EDUCATION	24,907.95
PREDATOR CONTROL	50,898.25
GAME LAW COMMITTEE	190.81
BOND INVESTMENT AND INTEREST	403,348.77

MISCELLANEOUS:

Game Damage Expense	\$ 8,287.66
Shop and Warehouse	20,997.91
Printing Licenses—Maps	27,037.89
Refunds	834.24
University Research Unit	7,242.77
Appropriation to Purchasing Department	826.83
Other Field Projects	2,679.53
Insurance—Automobile, Buildings	1,590.95
TOTAL MISCELLANEOUS	\$ 69,497.78
ENFORCEMENT	368,271.33

FISHERIES DIVISION:

Hatcheries:

Anaconda	\$ 40,240.72
Arlee	26,967.26
Big Timber	25,429.32
Bluewater	30,077.31
Emigrant	17,353.73
Great Falls	54,418.38
Hamilton	14,040.93
Lewistown	38,248.82
Libby	12,939.27
McNeil	8,089.50
Ovando	5,264.06
Polson	11,427.68
Somers	15,891.18
Creston, Ennis, Miles City (Fed.)	13,828.21
Spawning Stations	\$ 5,651.50
Other Field Projects	5,975.33
Federal Aid Program	64,927.12
TOTAL FISHERIES DIVISION	\$ 404,067.15

GAME FARMS:

Billings	\$ 17,705.28
Fort Peck	17,137.80
Warm Springs	19,800.38
Moiese	5,794.74
TOTAL GAME FARMS	\$ 60,438.20
WILDLIFE RESTORATION FEDERAL AID	584,783.30
TOTAL EXPENDITURES DURING FISCAL YEAR	\$2,081,171.72

DETAIL OF EXPENDITURES

For Fiscal Years Ending April 30,1953 and April 30, 1954

	APRIL 1953	APRIL 1954
COMMISSIONERS		
Per Diem	\$ 2,280.00	\$ 2,175.00
Operation	4,113.85	3,575.67
TOTAL COMMISSIONERS	\$ 6,393.85	\$ 5,750.67
ADMINISTRATION		
Salaries	\$ 61,743.82	\$ 65,343.82
Operation	31,124.97	40,735.32
Capital Expenditure	2,203.94	1,261.32
Repair and Replacement	728.26	1,677.05
TOTAL ADMINISTRATION	\$ 95,800.99	\$ 109,017.51
STATE TRAPPER		
Salaries	\$ 3,923.90	\$ 3,860.52
Operation	1,232.99	1,729.20
Capital Expenditure	20.94	13.09
Repair and Replacement	100.75	46.87
TOTAL STATE TRAPPER	\$ 5,278.55	\$ 5,649.68
PUBLIC INFORMATION AND EDUCATION		
Salaries ..	\$ 13,043.19	\$ 15,621.61
Operation	7,752.40	8,252.74
Capital Expenditure	2,378.60	518.40
Repair and Replacement	338.45	515.20
TOTAL INFORMATION AND EDUCATION	\$ 23,512.64	\$ 24,907.95
PREDATOR CONTROL		
Salaries	\$ 24,664.32	\$ 21,061.35
Operation	9,438.24	6,568.50
Mountain Lion, Bounties	3,927.00	4,405.00
Bob Cat, Bounties	13,132.60	12,468.26
Magpie and Crows, Bounties	1,451.61	745.46
Capital Expenditure	None	None
Repair and Replacement ..	None	None
TOTAL PREDATOR CONTROL	\$ 52,613.77	\$ 45,248.57
MISCELLANEOUS ACCOUNTS		
Game Damage	\$ 7,637.67	\$ 8,287.66
Warehouse Stores Account	5,929.49	809.17
Printing Licenses—Maps	8,891.28	27,037.89
Refunds	958.30	832.41
Appropriation to Purchasing Department	2,629.75	826.83
Other Field Projects	1,548.70	2,679.53
Insurance—Automobile, Buildings	1,513.56	1,590.95
TOTAL MISCELLANEOUS ACCOUNTS	\$ 29,108.75	\$ 42,064.44
UNIVERSITY RESEARCH UNIT		
Salaries	\$ 3,411.10	\$ 3,930.00
Operation	1,227.99	2,336.92
Capital Expenditure	1,773.18	975.85
Repair and Replacement	None	None
TOTAL UNIVERSITY RESEARCH UNIT	\$ 6,412.27	\$ 7,242.77
LAW COMMITTEE		
Operation	None	\$ 190.81
TOTAL LAW COMMITTEE		\$ 190.81
ENFORCEMENT		
Salaries	\$ 172,721.46	\$ 206,980.82
Operation	95,422.96	109,897.50
Capital Expenditure ..	12,575.91	40,645.34
Repair and Replacement	4,679.56	10,747.67
TOTAL ENFORCEMENT	\$ 285,399.89	\$ 368,271.33

DETAIL OF EXPENDITURES (Continued)

	APRIL 1953	APRIL 1954
FISHERIES DIVISION		
HATCHERIES		
ANACONDA		
Salaries	\$ 14,260.72	\$ 17,099.63
Operation	17,065.62	18,410.95
Capital Expenditure	4,512.66	329.40
Repair and Replacement	3,028.60	4,400.74
TOTAL ANACONDA HATCHERY	\$ 38,867.60	\$ 40,240.72
ARLEE		
Salaries	\$ 8,959.60	\$ 11,511.63
Operation	9,930.42	12,084.97
Capital Expenditure	205.96	411.03
Repair and Replacement	2,508.16	2,959.63
TOTAL ARLEE HATCHERY	\$ 21,604.14	\$ 26,967.26
BLUEWATER		
Salaries	\$ 6,011.90	\$ 8,192.02
Operation	8,493.84	13,498.60
Capital Expenditure	1,208.20	471.65
Repair and Replacement	12,714.96	7,915.04
TOTAL BLUEWATER HATCHERY	\$ 28,428.90	\$ 30,077.31
BIG TIMBER		
Salaries	\$ 6,846.67	\$ 11,282.19
Operation	6,740.44	8,311.93
Capital Expenditure	41.22	194.79
Repair and Replacement	813.15	5,640.41
TOTAL BIG TIMBER HATCHERY	\$ 14,441.48	\$ 25,429.32
EMIGRANT		
Salaries	\$ 8,514.05	\$ 9,302.57
Operation	4,977.20	6,525.07
Capital Expenditure	25.99	107.15
Repair and Replacement	3,118.75	1,418.94
TOTAL EMIGRANT HATCHERY	\$ 16,635.99	\$ 17,353.73
GREAT FALLS		
Salaries	\$ 8,444.00	\$ 11,077.33
Operation	20,061.65	22,029.94
Capital Expenditure	42.40	2,278.39
Repair and Replacement	1,139.70	19,032.72
TOTAL GREAT FALLS HATCHERY	\$ 29,687.75	\$ 54,418.38
HAMILTON		
Salaries	\$ 6,465.00	\$ 7,744.83
Operation	3,610.21	4,000.96
Capital Expenditure	44.05	233.19
Repair and Replacement	5,180.71	2,061.95
TOTAL HAMILTON HATCHERY	\$ 15,299.97	\$ 14,040.93
LEWISTOWN		
Salaries	\$ 10,492.70	\$ 10,278.30
Operation	18,059.98	19,411.27
Capital Expenditure	403.55	5,490.01
Repair and Replacement	2,873.49	3,069.24
TOTAL LEWISTOWN HATCHERY	\$ 31,830.17	\$ 38,248.82
LIBBY		
Salaries	\$ 7,692.00	\$ 7,248.30
Operation	4,934.39	4,444.78
Capital Expenditure	371.36	164.29
Repair and Replacement	12,492.38	1,081.93
TOTAL LIBBY HATCHERY	\$ 25,490.13	\$ 12,939.27

DETAIL OF EXPENDITURES (Continued)

	APRIL 1953	APRIL 1954
McNEIL		
Salaries	\$ 4,264.14	\$ 4,480.00
Operation	1,590.01	1,967.08
Capital Expenditure	242.05	60.73
Repair and Replacement	869.80	1,581.69
TOTAL McNEIL HATCHERY	\$ 6,966.00	\$ 8,089.50
OVANDO		
Salaries	\$ 3,540.41	\$ 3,429.06
Operation	1,455.26	1,188.64
Capital Expenditure	23.70	211.05
Repair and Replacement	737.43	435.31
TOTAL OVANDO HATCHERY	\$ 5,756.80	\$ 5,264.06
POLSON		
Salaries	\$ 5,534.00	\$ 6,769.00
Operation	1,663.27	15,032.62
Capital Expenditure	74.59	721.59
Repair and Replacement	1,378.17	2,441.47
TOTAL POLSON HATCHERY	\$ 8,650.03	\$ 11,427.68
SOMERS		
Salaries	\$ 6,412.67	\$ 9,466.43
Operation	4,103.59	3,347.37
Capital Expenditure	104.27	451.86
Repair and Replacement	2,161.62	2,625.52
TOTAL SOMERS HATCHERY	\$ 12,782.15	\$ 15,891.18
FISHERIES GENERAL		
Salaries	\$ 1,750.59	\$ 2,099.52
Operation	3,286.72	6,290.57
Capital Expenditure	2,117.43	1,137.54
Repair and Replacement	454.86	3,769.20
TOTAL FISHERIES GENERAL	\$ 7,609.60	\$ 13,296.83
SPAWNING STATIONS		
Salaries	\$ 3,233.95	\$ 3,707.02
Operation	2,880.18	1,478.26
Capital Expenditure	125.29	None
Repair and Replacement	580.99	466.22
TOTAL SPAWNING STATIONS	\$ 6,820.41	\$ 5,651.50
OTHER FIELD PROJECTS		
Salaries	\$ 4,110.59	\$ 2,698.60
Operation	4,043.05	1,499.16
Capital Expenditure	3,439.96	436.40
Repair and Replacement	1,414.68	1,341.17
TOTAL OTHER FIELD PROJECTS	\$ 13,008.28	\$ 5,975.33
DINGELL-JOHNSON PROJECTS		
Salaries	\$ 37,151.70	\$ 44,829.80
Operation	13,006.40	13,760.57
Capital Expenditure	11,626.66	2,840.14
Repair and Replacement	1,467.29	3,496.12
TOTAL DINGELL-JOHNSON PROJECTS	\$ 63,252.05	\$ 64,927.12
FEDERAL HATCHERIES—CRESTON, ENNIS, MILES CITY		
Salaries	\$ 5,436.35	\$ 6,308.50
Operation	8,062.49	7,338.80
Capital Expenditures	16.30	130.00
Repair and Replacement	60.62	50.91
TOTAL FEDERAL HATCHERIES	\$ 13,575.76	\$ 13,828.21
TOTAL FISHERIES DIVISION	\$ 360,707.21	\$ 404,067.15
GAME FARM DIVISION		
BILLINGS		
Salaries	\$ 9,816.94	\$ 10,829.73
Operation	9,954.67	5,455.71
Capital Expenditure	705.38	409.67
Repair and Replacement	332.14	1,010.17
TOTAL BILLINGS GAME FARM	\$ 20,809.13	\$ 17,705.28

DETAIL OF EXPENDITURES (Continued)

	APRIL 1953	APRIL 1954
FORT PECK		
Salaries	\$ 7,930.97	\$ 8,211.18
Operation	7,298.11	7,098.60
Capital Expenditure	263.08	729.74
Repair and Replacement	2,097.44	1,098.28
TOTAL FORT PECK GAME FARM	\$ 17,589.60	\$ 17,137.80
WARM SPRINGS		
Salaries	\$ 7,996.33	\$ 8,240.71
Operation	7,990.88	7,545.62
Capital Expenditure	1,321.25	51.33
Repair and Replacement	653.56	3,962.72
TOTAL WARM SPRINGS GAME FARM	\$ 17,962.02	\$ 19,800.38
MOIESE		
Salaries	\$ 2,399.33	\$ 3,058.09
Operation	986.63	1,556.28
Capital Expenditure	470.75	343.88
Repair and Replacement	672.35	836.49
TOTAL MOIESE GAME FARM	\$ 4,529.06	\$ 5,794.74
TOTAL GAME FARMS	\$ 60,889.81	\$ 60,438.20
WAREHOUSE AND SHOP		
Salaries		\$ 15,825.82
Operation		2,399.81
Capital Expenditure		117.84
Repair and Replacement		1,847.10
TOTAL WAREHOUSE AND SHOP		\$ 20,190.57
BOND INVESTMENT AND INTEREST		\$ 403,348.77
WILDLIFE RESTORATION, FEDERAL AID		
Salaries	\$ 156,084.07	\$ 193,699.94
Operation	70,222.94	100,105.79
Capital Expenditure	67,406.68	205,214.52
Repair and Replacement	39,839.66	85,763.05
TOTAL WILDLIFE RESTORATION, FEDERAL AID	\$ 333,553.35	\$ 584,783.30
GRAND TOTAL OF EXPENDITURES	\$ 1,280,649.03	\$ 2,081,171.72
TOTAL SALARIES ALL DIVISIONS	\$ 615,136.47	\$ 736,363.32
TOTAL OPERATION ALL DIVISIONS	449,329.71	907,564.91
TOTAL CAPITAL EXPENDITURE ALL DIVISIONS	113,745.35	265,950.19
TOTAL REPAIR AND REPLACEMENT ALL DIVISIONS	102,437.50	171,293.30
GRAND TOTAL OF EXPENDITURES	\$ 1,280,649.03	\$ 2,081,171.72

RECAPITULATION OF FUNDS

May 1, 1952 to April 30, 1953

and

May 1, 1953 to April 30, 1954

Balance Forward April 30, 1952		\$ 644,922.10
Income May 1, 1952—April 30, 1953		1,561,007.16
Funds Available During Period 1952-53	\$ 2,205,929.26	
Disbursements During Period 1952-53	1,280,649.03	
Balance April 30, 1953		\$ 925,280.23
Income May 1, 1953—April 30, 1954		1,757,571.00
Funds Available During Period 1953-54	\$ 2,682,851.23	
Disbursements During Period 1953-54	2,083,048.72	
Balance with State Treasurer April 30, 1954		\$ 599,802.51
Bond Investments		400,000.00
Bond Investment Interest		3,348.77
Total Funds April 30, 1954		\$ 1,003,151.28

1952 LICENSE SALES BY COUNTIES

COUNTY	Resident Bird & Fish	Resident Big Game	Tourist Fishing	Non-Resident Fishing	Non-Resident Bird	Non-Resident Big Game	Special Permits	TOTALS
Beaverhead	3,091	2,031	2,681	276	5	79		8,163
Big Horn	1,945	1,365	157	34	11	2		3,514
Blaine	1,414	799	36	17				2,266
Broadwater	1,178	962	87	11	2	4		2,244
Carbon	3,132	1,853	374	54		10		5,423
Carter	714	677	2					1,393
Cascade	17,737	9,901	632	112	13	65		28,460
Chouteau	1,890	1,294	46	8		5		3,243
Custer	3,343	2,696	51	43	1	13		6,147
Daniels	645	352	2	1				1,000
Dawson	2,275	1,701	64	19	2	3		4,064
Deer Lodge	4,358	2,157	576	73		11		7,175
Fallon	814	716	12	4				1,546
Fergus	5,936	4,976	325	33	2	31		11,303
Flathead	13,287	8,351	2,190	403	13	135		24,379
Gallatin	7,742	4,824	7,193	1,063	12	262		21,096
Garfield	574	515	28	2		3		1,122
Glacier	2,313	779	226	38	3	32		3,391
Golden Valley	444	359	20	3				826
Granite	1,111	874	161	22		16		2,184
Hill	3,592	1,347	90	28	4	7		5,068
Jefferson	1,335	987	173	19		4		2,518
Judith Basin	1,219	1,007	66	11		7		2,310
Lake	4,192	1,854	1,535	166	29	14		7,790
Lewis & Clark	8,765	6,094	632	130	8	256		15,885
Liberty	373	110	2					485
Lincoln	4,212	3,047	1,166	178	3	16		8,622
Madison	2,379	1,588	1,690	203	10	45		5,915
McCone	547	418	21					986
Meagher	1,084	905	114	19		11		2,133
Mineral	1,189	944	695	601	26	18		3,473
Missoula	11,434	7,046	1,380	309	27	163		20,359
Musselshell	1,818	1,441	90	9		3		3,361
Park	4,717	3,628	765	161		104		9,375
Petroleum	422	374	2					798
Phillips	1,702	1,351	30	10	1			3,094
Pondera	2,498	1,136	132	24	1	2		3,793
Powder River	721	641	5	2		8		1,377
Powell	2,431	1,836	219	40		40		4,566
Prairie	416	320	7	5				748
Ravalli	4,175	2,558	990	113	14	75		7,925
Richland	2,051	1,503	20	12	17	8		3,611
Roosevelt	2,261	1,449	51	22	2	8		3,793
Rosebud	1,579	1,420	31	8	1	2		3,041
Sanders	3,025	2,197	741	190	13	26		6,192
Sheridan	1,099	690	2	1	8	1		1,801
Silver Bow	12,636	5,758	776	101	2	44		19,317
Stillwater	1,958	1,523	210	56	2	3		3,752
Sweet Grass	1,542	1,201	236	47	1	6		3,033
Teton	2,240	1,275	119	32	6	14		3,686
Toole	1,831	742	49	44	3	1		2,670
Treasure	310	287	3					600
Valley	2,902	1,535	208	18	2	1		4,666
Wheatland	1,572	1,259	161	23	3	22		3,040
Wibaux	333	274	5	15				627
Yellowstone	15,267	9,639	661	204	15	35		25,821
Special Moase							211	211
Special Antelope							18,622	18,622
Special Elk							341	341
Special Deer							4,270	4,270
Totals	183,770	116,566	27,940	5,017	262	1,615	23,444	358,614

1953 LICENSE SALES BY COUNTIES

COUNTY	Resident Bird & Fish	Resident Big Game	Tourist Fishing	Non-Resident Fishing	Non-Resident Bird	Non-Resident Big Game	Bow and Arrow	TOTALS
Beaverhead	3,007	2,078	3,334	258	2	94	15	8,788
Big Horn	1,898	1,242	146	38	1	1	2	3,328
Blaine	1,422	862	41	8	---	---	1	2,334
Broadwater	1,190	886	88	6	---	2	4	2,176
Carbon	2,888	1,761	430	66	---	9	2	5,156
Carter	607	550	1	2	---	---	---	1,160
Cascade	17,020	10,292	644	86	2	66	72	28,182
Chouteau	1,645	1,247	33	1	---	---	1	2,927
Custer	3,196	2,632	64	17	---	13	7	5,929
Daniels	611	421	3	---	1	---	---	1,036
Dawson	2,400	1,856	61	12	2	5	---	4,336
Deer Lodge	4,454	2,302	733	46	---	8	8	7,551
Fallon	902	767	16	5	---	2	---	1,692
Fergus	5,426	4,600	292	30	2	24	2	10,376
Flathead	12,831	8,323	2,461	320	10	118	25	24,088
Gallatin	7,934	5,236	7,909	922	13	251	41	22,306
Garfield	491	476	27	---	---	---	---	994
Glacier	2,208	833	277	36	2	25	20	3,401
Golden Valley	438	318	10	---	---	---	6	772
Granite	1,091	821	151	17	---	15	---	2,095
Hill	3,706	1,715	92	17	4	8	41	5,583
Jefferson	1,284	937	255	12	---	11	---	2,499
Judith Basin	1,142	963	68	4	---	11	---	2,188
Lake	3,998	1,864	1,993	123	10	12	---	8,000
Lewis & Clark	8,444	5,795	831	113	5	266	53	15,507
Liberty	511	229	5	7	---	---	15	767
Lincoln	4,483	3,258	1,115	128	---	12	23	9,019
Madison	2,328	1,519	1,654	141	11	42	2	5,697
McCone	536	424	22	2	---	---	---	984
Meagher	1,016	815	124	13	---	11	---	1,979
Mineral	1,254	983	564	490	14	22	---	3,327
Missoula	11,140	6,711	1,557	194	13	156	22	19,793
Musselshell	1,686	1,379	123	9	---	14	3	3,214
Park	4,942	3,710	924	135	---	127	10	9,848
Petroleum	394	380	---	---	---	---	---	774
Phillips	1,593	1,299	25	4	---	7	1	2,929
Pondera	2,436	1,288	165	37	2	9	17	3,954
Powder River	636	559	8	2	---	7	2	1,214
Powell	2,363	1,710	230	30	---	17	5	4,355
Prairie	489	417	5	---	---	---	---	911
Ravalli	4,061	2,428	1,048	85	4	64	---	7,690
Richland	2,122	1,746	17	5	18	14	2	3,924
Roosevelt	2,437	1,629	59	16	1	2	---	4,144
Rosebud	1,406	1,219	25	3	---	8	6	2,667
Sanders	2,747	2,051	732	128	8	23	---	5,689
Sheridan	1,171	785	5	---	10	---	---	1,971
Silver Bow	13,270	6,322	1,084	102	4	16	24	20,822
Stillwater	2,078	1,528	236	75	---	3	---	3,920
Sweet Grass	1,469	1,131	237	33	---	11	1	2,882
Teton	2,227	1,293	142	16	4	25	9	3,716
Toole	1,741	849	61	28	---	2	10	2,691
Treasure	268	234	4	---	---	---	---	506
Valley	3,070	1,868	188	29	1	1	13	5,170
Wheatland	1,447	1,100	146	19	2	17	19	2,750
Wibaux	343	284	15	14	---	---	---	656
Yellowstone	15,663	10,059	815	196	3	56	51	26,843
Totals	181,560	117,984	31,295	4,080	149	1,607	535	337,210
Special Permits								
Special Antelope	---	---	---	---	---	23,677	---	23,677
Special Moose	---	---	---	---	---	142	---	142
Special Mt. Sheep	---	---	---	---	---	30	---	30
Special Mt. Goat	---	---	---	---	---	50	---	50
Special Buffalo	---	---	---	---	---	3	---	3
STATE—Total All	---	---	---	---	---	23,902	---	361,112

FISH AND GAME VIOLATIONS **By Counties**

	May 1, 1952 to April 30, 1953	May 1, 1953 to April 30, 1954
Beaverhead	24	40
Big Horn	10	6
Blaine	11	3
Broadwater	11	8
Carbon	17	13
Carter	3	24
Cascade	34	14
Chouteau	9	4
Custer	20	3
Daniels	—	—
Dawson	2	—
Deer Lodge	37	41
Fallon	—	—
Fergus	7	4
Flathead	60	45
Gallatin	45	58
Garfield	4	2
Glacier	5	6
Golden Valley	1	—
Granite	17	12
Hill	12	11
Jefferson	10	32
Judith Basin	8	7
Lake	13	30
Lewis and Clark	13	25
Liberty	—	4
Lincoln	35	19
Madison	44	38
McCone	—	3
Meagher	12	12
Mineral	25	35
Missoula	27	39
Musselshell	1	—
Park	8	13
Petroleum	1	—
Phillips	9	1
Pondera	24	27
Powder River	6	6
Powell	25	31
Prairie	1	3
Ravalli	10	13
Richland	10	9
Roosevelt	11	13
Rosebud	21	8
Sanders	19	10
Sheridan	3	16
Silver Bow	4	17
Stillwater	16	18
Sweet Grass	10	9
Teton	9	14
Toole	2	8
Treasure	4	5
Valley	10	12
Wheatland	17	—
Wibaux	—	—
Yellowstone	45	39
TOTALS	782	810

FISH AND GAME VIOLATIONS **Classified as Follows**

	May 1, 1952 to April 30, 1953	May 1, 1953 to April 30, 1954
Fishing Violations (All Types)	329	351
Big Game Hunting (All Types)	290	272
Trapping	16	31
Improper Licenses	78	73
Game Bird (All Types)	69	83
TOTALS	782	810



